

User Manual

Automated Tissue Microarrayer

Quick Ray[®] Master
UATM-272



NOTE

This manual describes the installation and operation of Quick Ray Master UATM-272.

Review this manual to avoid injury and prevent damage to this product or any products connected to it before you operate this instrument. To avoid potential hazards, use this product only as specified in this manual.

This documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for any failure or damage or injury caused by improper use or improper or inadequate maintenance and care. Unitma Co., Ltd. shall not be obligated to furnish service under this case a) to repair damage resulting from attempts by personnel other than Unitma Co., Ltd. representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Unitma Co., Ltd. supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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1. IMPORTANT NOTES

1.1. Explanation of Symbols used



WARNING: WARNING indicates an injury hazard not immediately accessible as you read this symbol. It calls attention to an operating procedure, practice, or the like, that if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.



CAUTION: CAUTION indicates a hazard not immediately accessible as you read this symbol. It calls attention to an operating procedure, practice, or the like, that if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.



Protective Ground or Earth Terminal. Used to indicate a circuit common connected to grounded chassis.



Main Power Connected or ON



Main Power Not Connected or OFF



(Pushed) : PC POWER on



(Pulled) : PC POWER off

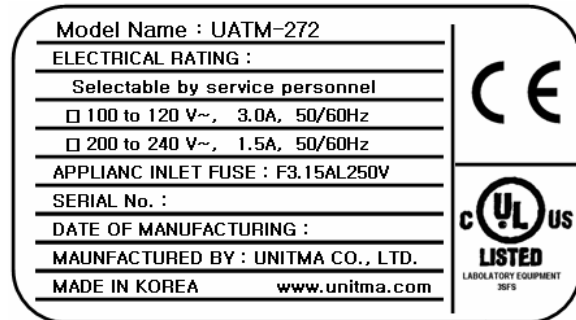


BIOHAZARD WARNING: BIOHAZARD WARNING indicates an injury or hazard not immediately accessible as you read this symbol.

Bio-hazard (Infectious agent): A type of micro-organism, bacteria, mold, parasite or virus which normally causes, or significantly contributes to the cause of, increased morbidity or mortality of human beings.

1.2. Name plate

The name plate of UATM-272 is at the right side of UATM-272. The name plate indicates the serial number, year of manufacture, the power rating and frequency.



1.3. Qualification of personnel



The Quick Ray Master UATM-272 should be operated by trained "Histopathology laboratory" personnel.

All laboratory personnel designated to operate UATM-272 is required to read this entire manual before operating UATM-272.

1.4. Intended use of the instrument

The Quick Ray Master UATM-272 is an automated Tissue Microarrayer for extracting the tissues from donor blocks and subsequently delivering them into recipient blocks.

- 1) The user inserts donor blocks into donor block tray and a recipient block into Recipient block holder tray, and puts each block tray into the Main plate. (Donor blocks should be made from "paraffin embedded tissues" and recipient block should be just only UB06 supplied and made by UNITMA Co., Ltd.)
- 2) The user can see images of donor blocks and recipient blocks on a built-in LCD monitor, and can use the touch screen to adjust settings and run the UATM-272. User can select and save the specific position for extraction of tissue core on the selected donor block image and the specific hole of corresponding recipient block by clicking the block image and button image of the touch screen.
- 3) When the user clicks the '**UATM.exe**' button in software program for the TMA procedure, UATM-272 executes the TMA block construction process as programmed by the user.
- 4) The user can print the TMA report generated in UATM-272 with an external printer and save the Excel files of the recipient block data into a USB memory stick.



The use of the instrument for any other purpose than originally intended may damage the instrument or injure the user and will void all warranties.

2. SAFETY NOTES



Read the following safety notes to avoid injury and prevent damage to this product or any products connected to it.



Misuse of electrical equipment can cause electrocution, burns, fire and other HAZARDS.

READ THIS BEFORE USING THE INSTRUMENT



- 1) Check that the voltage setting matches the supply voltage.
- 2) Connection to MAIN POWER SUPPLY:
 - a) For plug-connected instrument only: Where protective ground is required, plug the instrument into a supply outlet which has an earth connection;
 - b) For PERMANENTLY CONNECTED INSTRUMENT only: Do not use the instrument until it has been installed by a qualified electrician or authorized service engineer.
- 3) Unplug the instrument immediately after use.
- 4) Unplug the instrument before filling with liquid.
- 5) Do not place the instrument in liquid, nor put it where it could fall into liquid. If the instrument becomes wet, unplug it before touching it.
- 6) Do not leave the instrument unattended while it is plugged in.
- 7) Use the instrument only for the purpose described in the instructions for use.
- 8) Do not use accessories which are not supplied or recommended by the manufacturer.
- 9) Do not use the instrument if it is not working properly, or if it has suffered any damage.

NOTE. Examples of physical damage include:

 - a) damage to the flexible supply cord or its plug;
 - b) damage caused by dropping the instrument;
 - c) damage caused by dropping the instrument into water or splashing water onto it
- 10) Do not let the instrument or its flexible cord come into contact with surfaces which are hot.
- 11) Do not block air openings or place instrument on a soft surface which might block them, and keep air openings free from lint, hair, fluff, etc.
- 12) Do not place anything on top of the instrument.
- 13) Unless specifically instructed to do so by this operating manual, do not drop or put anything into any opening in the instrument, or into any hose or coupling.
- 14) Do not use the instrument where aerosol sprays are being used or where oxygen is being administered.
- 15) Do not use the instrument out door.

To avoid fire and the instrument failure



- Observe all warnings and instructions.
- Observe all Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.
- Power Disconnection. The power switch disconnects the product from the power source. See instructions for the location. Do not block the power switch; it must remain accessible to the user at all times.
- Regularly inspect the AC power cord for damage and for dust build-up around the power plug or electrical outlet.
- Stop using and unplug the AC power cord from the electrical outlet and disconnect any other cables immediately in the following cases; when the instrument functions in an abnormal manner, produces unusual sounds, if there is unpleasant or offensive odor, and becomes too hot to touch.
- Do not operate when the front door of the instrument is opened. Close the front door before operating this instrument.
- Do not operate with suspected failures. If you suspect that there is damage to the product, have it inspected by Unitma Co., Ltd.
- Avoid exposed circuitry. Do not touch exposed connections and components with the power turned on.
- Do not operate in wet/damp conditions.
- Do not operate in a high concentration of explosive gases atmosphere.
- Keep the instrument surfaces clean and dry.
- Do not allow liquid or small particles to get into the instrument or accessories.
- Do not throw or drop the system or accessories, or subject the instrument to strong physical shock.
- Unplug the AC power cord from the electrical outlet before cleaning.

Using in proper environment

- Provide proper ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.
- Do not expose the system or accessories to high temperatures, high humidity, or direct sunlight.
- Do not expose the instrument or accessories to dust, smoke or steam.
- Do not place the instrument on surfaces that are tilted, unstable or subject to vibration.
- Do not put heavy objects on the instrument or accessories.
- Do not use the instrument where oxygen gas is used

To avoid personal injury

- Be careful not to compress your fingers when closing the front door of the instrument.
- Use in a well illuminated area and keep the LCD screen in a safe distance from your face.
- Keep the front door of the instrument in a safe distance from your head and face.
- Do not operate without covers. Do not operate this product if covers or panels are removed.
- Keep the instrument and accessories out of the reach of children.
- Do not touch the plug of the AC power cord with wet hands.
- Be careful with your fingers or hands from being injured while assembling or disassembling the tip body or the block holder frame, or when cleaning the interior of the instrument.

AC power cord use and Ground

- Use Proper Power Cord. Use only the power cord specified for this instrument and certified for the country of use. Verify the voltage and frequency of AC power source.
- Ground the instrument. This instrument is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.
- When disconnecting the AC power cord, hold it by the plug and pull straight out from the electrical socket. Never pull by the cord or pull at an angle.

Use the instrument and accessories according to the instructions in this manual



- Use the instrument and accessories according to the instructions in this manual. Neither authorization for the analysis or modification of the instrument, nor the analysis and use of its circuit configurations, is provided.
- Never disassemble the instrument or supplied accessories. Disassembling will void the instrument warranty. Additionally, there is a risk of fire, electrical shock or malfunction.
- Do not use accessories that are not supplied or recommended by UNITMA.
- Contact UNITMA for repairing service or to purchase accessories.

Do not use the Donor block or a sample with a biological hazard or a chemical hazard.



Do not use the donor block or a sample with biological hazardous substances and/or chemical hazardous substances that can impact human health.

To avoid puncher tip a damage



Keep the puncher tip clean and do not use the instrument if there are foreign things (Silk fiber, Stapler pin, Calcification tissue, Bone and Teeth) in the puncher tip

Handle biohazards.



- Working with infectious material requires the following precautions.
 - a. Limit access to areas where experiments with infectious specimens are in progress.
 - b. Clearly label areas where biohazards are in use and designate specific areas where biohazards are routinely used, using this symbol (black on red background):



- c. Wear lab coat, gloves and safety glasses to prevent contamination from the infectious specimen, and remove them when leaving the work area.
- d. Decontaminate work surfaces once per day and after any spill of viable specimen.
- e. Eating, drinking and applying cosmetics are not permitted in the work area.
- f. Wash hands after handling viable specimens before leaving the lab.
- g. Transport contaminated materials in leak-proof containers clearly marked with biohazard labels

Biohazard Determination.



- Lab Bio-safety Level (BSL) Criteria.

The following guidelines can be used by all laboratory personnel.

- Bio-safety Level 1 is appropriate for undergraduate and secondary educational training and teaching laboratories and/or other facilities in which work is done with defined and characterized strains of viable microorganisms not known to cause disease in healthy adult humans.
- Bio-safety Level 2 is applicable to clinical, diagnostic, teaching and other facilities in which work is done with the broad spectrum of indigenous moderate-risk agents present in the community and associated with human disease of varying severity.
- Bio-safety Level 3 is applicable to clinical, diagnostic, teaching, research, or manufacturing facilities in which work is done with indigenous or exotic agents where the potential for infection by aerosols is real and the disease may have serious or lethal consequences.
- Bio-safety Level 4 is applicable to work with dangerous and exotic agents which pose a high individual risk of life-threatening disease for which there is no vaccine or other treatment available.

- Practices and Techniques, Safety Equipment

Bio-safety Level	Practices and Techniques	Safety Equipment	Facilities
1	Standard microbiological practices	None: primary containment provided by adherence to standard laboratory practices during open bench operations.	Basic
2	Level 1 practices plus: Laboratory coats; decontamination of all infectious wastes; limited access; protective gloves and biohazard warning signs as indicated.	Partial containment equipment (i.e., Class I or II Biological Safety Cabinets) used to conduct mechanical manipulative procedures that have high aerosol potential that may increase the risk of exposure to personnel.	Basic
3	Level 2 practices plus: special laboratory clothing; controlled access.	Partial containment equipment used for all manipulations of infectious material.	Containment
4	Level 3 practices plus : airlock system negative air pressure	Maximum containment equipment.	Maximum Containment

3. INSTRUMENT COMPONENTS AND SPECIFICATIONS

3.1. Instrument description

- **Tissue Microarray (TMA)**

Tissue Microarrays are a collection of multiple tissue cores that are arranged in columns and rows inside a paraffin block allowing for histological analysis. They are a crucial tool in the analysis of gene and protein expression levels in samples from normal and diseased specimens. Further, they are useful in the early-stage discovery of gene targets in genomic research, validating targets, testing and optimization of diagnostic tests, and in the quality control of molecular detection schemes. And the 'Tissue array' technology not only makes decrease the reagent, time and human resource below one sixtieth but also can be applied to most of the know-how about tissues for immunohistochemistry, in situ hybridization, FISH and in situ PCR.

- **Quick Ray Master UATM-272**

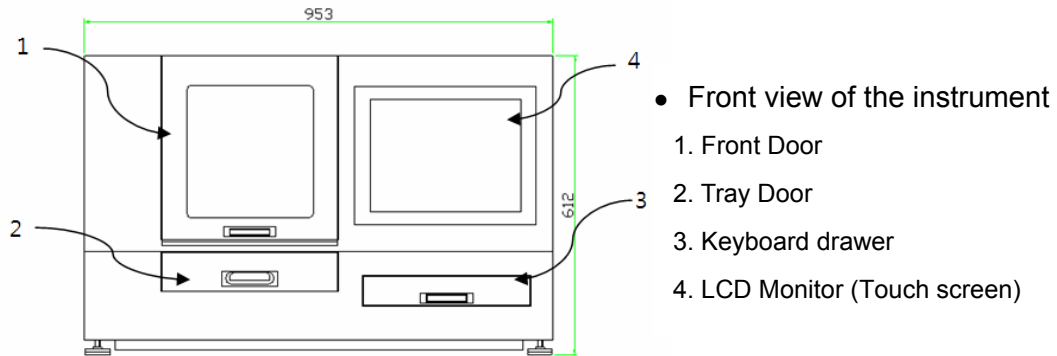
The instrument, Quick Ray Master UATM-272, is an automated tissue microarrayer for extracting tissues from donor blocks and subsequently delivering them into the recipient block.

The Recipient block (UB06), the patented technologies of UNITMA, is made of special materials that melts when heated at 60°C for 30 minutes and has pre-made, evenly spaced round wells arranged in a square matrix. Therefore, using UNITMA recipient block will save the conventional block building time and guide the pathologists to fully utilize the power of TMAs.

The instrument uses these ready to use pre-made recipient blocks, helping to decrease the time and labor needed for block creation. In addition, because it has one tip module that holds 3 tips (hole size: 1mm, 2mm and 3mm) which can automatically be changed simply by using the software, there is no need for disassembling or assembling punch modules when changing the hole size. The instrument provides an automatic mode for quick and easy use and a semi-automatic mode for manual user.

The instrument has a built-in computer run by MS Windows XP OS and an LCD monitor with a touch screen, and is also connected to an external monitor, USB keyboard and USB mouse. Also, the quick help function key is available for various tips including instructions on saving image files and reporting the information of recipient blocks. The user can also save image files and report files through an external USB memory and an external PC with LAN interface.

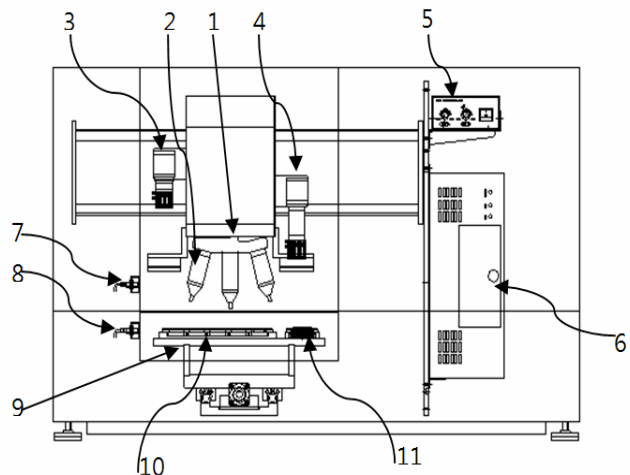
3.2. Instrument components



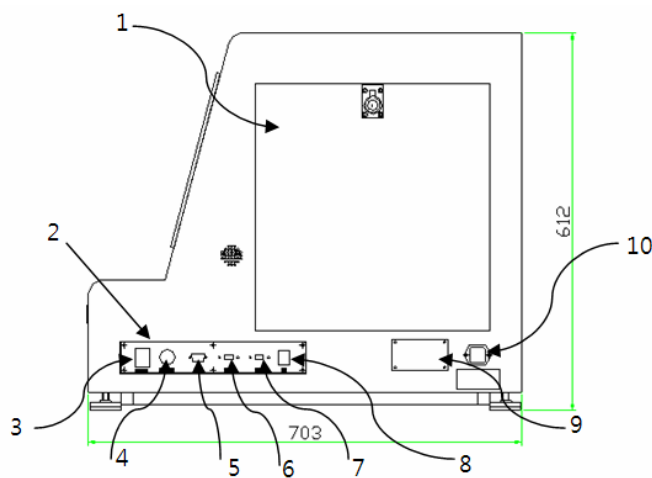
<Fig. 3.2-1>, Front view of the instrument

- Inner view of the instrument

1. Puncher Module
2. Puncher (1mm, 2mm, and 3mm)
3. Camera 1
4. Camera 2
5. Light controller
6. Computer
7. Front door sensor
8. Tray door sensor
9. Main plate
10. Donor block tray



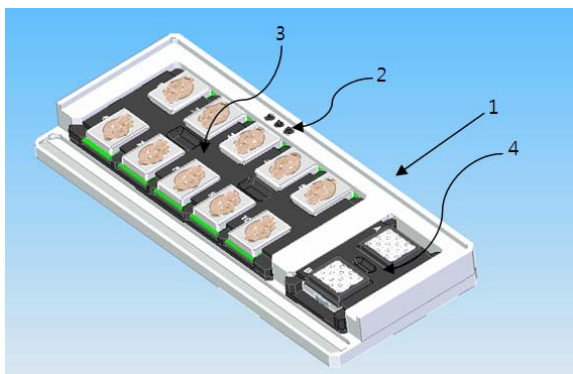
<Fig. 3.2-2> Inner view of the instrument



<Fig. 3.2-3>, Right view of the instrument

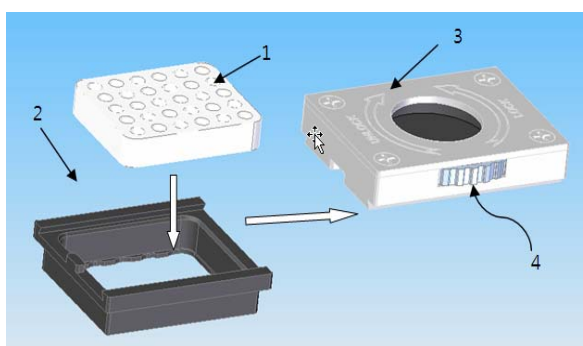
- Right view of the instrument

1. Right side door
2. I/O port panel
3. Main power switch
4. PC power switch
5. Monitor connector (DVI type)
6. USB connector 1
7. USB connector 2
8. LAN connector
9. Name plate
10. A/C power inlet



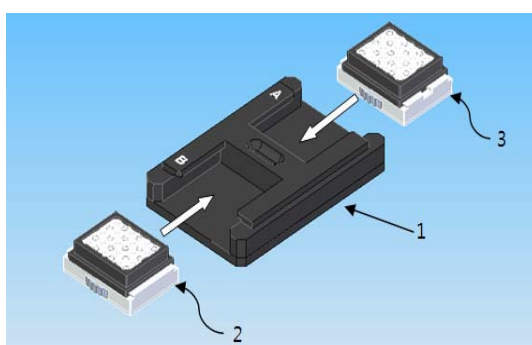
<Fig. 3.2-4>, Main plate

- Main plate picture
- 1. Main plate
- 2. Calibration point
- 3. Donor block tray
- 4. Recipient block holder tray



<Fig. 3.2-5>, Recipient block holder

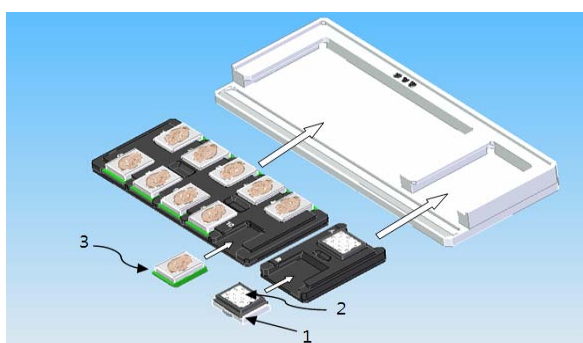
- Recipient block holder
- 1. Recipient block
- 2. Recipient block holder top
- 3. Recipient block holder body
- 4. Adjust screw



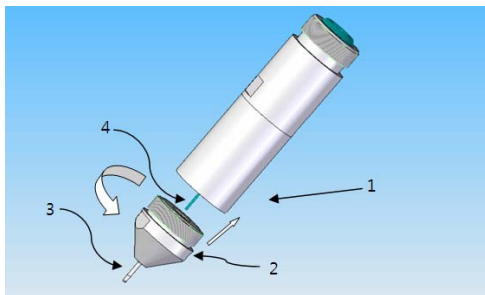
<Fig. 3.2-6>, Recipient block holder tray

- Recipient block holder tray
- 1. Recipient block holder tray
- 2. & 3. Recipient block holder

- Set up trays
- 1. Recipient block holder.
- 2. Recipient block
- 3. Donor block



<Fig. 3.2-7>, Set up trays



- Puncher
- 1. Puncher body
- 2. Tip
- 3. Tip needle
- 4. Plunger (Core ejector)

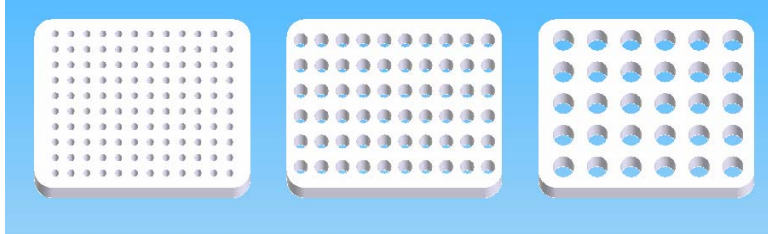
<Fig. 3.2-8>, Puncher

3.3. Instrument specifications

Approvals:	UL / CE/ ISO
Nominal supply voltages:	Selectable by service personnel (100 to 120 VAC, 200 to 240 VAC)
Nominal supply current:	Selectable by service personnel (3A, 0.5A), 0.3kw
Nominal frequency:	50 / 60Hz
Weight:	148 kg
Max size (W x D x H):	953 x 703 x 610 mm
Operating temperature range:	+10 °C to +35 °C
Transportation/Storage temperature range	+5°C to +55 °C
Relative humidity:	Max. 80% non-condensing
Operating Control type	PC type (Industrial chassis) CPU : Intel Dual Core (2.2GHz) RAM : 1G HDD : 160GB
Operating system	Windows XP PRO, MS Excel
Monitor	LCD monitor 15" (1,024 x 768) Touch screen
Camera resolution	1,280 x 1,024 (2,592 x 1,944) pixels (2 sets)
Camera CCD Size	2.2µm x 2.2µm
Camera spectral sensitivity	Color
1 Pixel resolution	30µm (Donor block), 5µm (Recipient block)
Illuminating	LED type (2 sets)
Recipient block	UNITMA Recipient block (consumable)
Punch size	1, 2, and 3mm (3 types)
Tray stage capacity	10 Donor blocks and 2 Recipient blocks
Time per 1 cycle	15 ~ 18sec (Pick & Place)
Operating environment condition	Indoor use only
Over voltage Category	II
Pollution degree	IIIa or IIIb
Mains voltage fluctuation	Up to ±10%

3.4. Consumables (Recipient block)

The patented recipient block is made of a special material that melts when heated at 60 °C for 30 minutes. The recipient block has pre-made, evenly spaced round orifices (wells) arranged in a square matrix (array). Three different recipient blocks are available:



<Fig. 3.4-1>

10 x 12 wells of 1mm in diameter

6 x 10 wells of 2mm in diameter

5 x 6 wells of 3mm in diameter

Weights: 3.5g

Use only the pre-made recipient blocks (UB06) supplied by Unitma Co., Ltd.

4. SET UP THE INSTRUMENT

4.1. Installation site requirements

- **Transporting the instrument**



- Disconnect all external cables before transporting the instrument.
- Never attempt to transport the instrument by yourself. Three or more people are required to transport the instrument for transporting without causing injury or damaging the instrument.
- Ensure that your footing is solid, and balance the weight of the instrument between your feet.
- Transport the instrument slowly, and never move suddenly or twist your body during transportation.
- Keep your back straight and transport with your legs, not on your back. If you must bend down to transport the instrument, bend at the knees, not at the waist, to reduce the strain on your back muscles.

The weight of the instrument is about 148 kg. The instrument should not be moved frequently. Before you install the instrument, ensure that your site is properly prepared so you can avoid having to move the instrument later to accommodate power sources and network connections.

- **To transport the instrument safely, perform the following steps:**

- 1) Since the weight of the instrument is over 148 kg, we recommend four adult people to safely move the instrument.
- 2) Minimum four people working together should hold each corner of the instrument.
- 3) Each person holding one corner with both hands should move in coordination to move the instrument.
- 4) Be careful when moving the instrument to avoid any physical damage.



<Fig. 4.1-1>

- **Floor loading requirement**

Ensure that the floor under the instrument is capable of supporting all other installed instrument.

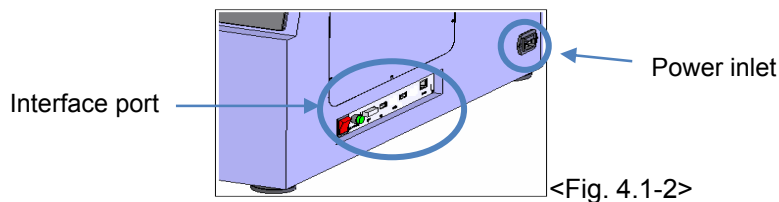
The instrument is about 148kg.

Do not put any objects on the instrument or accessories.

- **Positioning the instrument**

1) The left side of the instrument must remain unobstructed to ensure adequate airflow and prevent overheating inside the instrument. Refer to next instruction "Ventilation requirement".

2) The interface port in the right side of the instrument is for connecting the cables for interfacing external devices. Ensure that connecting cable is not obstructed.



3) The power cord in the right side of the instrument is for connecting the power cable to AC power source. Ensure that connecting cable is not obstructed.

4) Allow the following clearances for normal system maintenance:

At the top of the instrument : At least 2ft (60.96cm)

In the front of the instrument : At least 4ft (121.92cm)

- **Ventilation requirement**

The air intake and exhaust areas must be free from obstructions. Unrestricted air flow is required for proper cooling. Ensure that air flow is not obstructed.



When installing or using the instrument, provide at least 4"(100mm) clearance left from the instrument for proper cooling.

- **Relative humidity (non-condensing)**

Operating: 20 to 60%

Storage: 20 to 60%

- **Temperature**

Operating: 10°C to 35°C (50°F to 95°F)

Storage: 5°C to 40°C (50°F to 143°F)

- **No direct sunlight.**

- **Do not use an extension cord.**



Do not operate the instrument in rooms where possible accumulation of gases may cause explosion or explosive materials are stored.

4.2. Setup

4.2.1. Fitting the puncher into the instrument



- **Punchers are assembled when you receive the instrument. If the Tip needle become damaged or loses sharpness you need to change them as the following instructions**
- **The puncher should be put into the correct position in the puncher module of the instrument.**

- 1) Turn off the instrument.
- 2) Open the front door.
- 3) Put the puncher into the puncher module of the instrument.



<Fig. 4.2-1>, Puncher Module

- 4) Close the front door.

4.2.2. Interfacing with the external devices

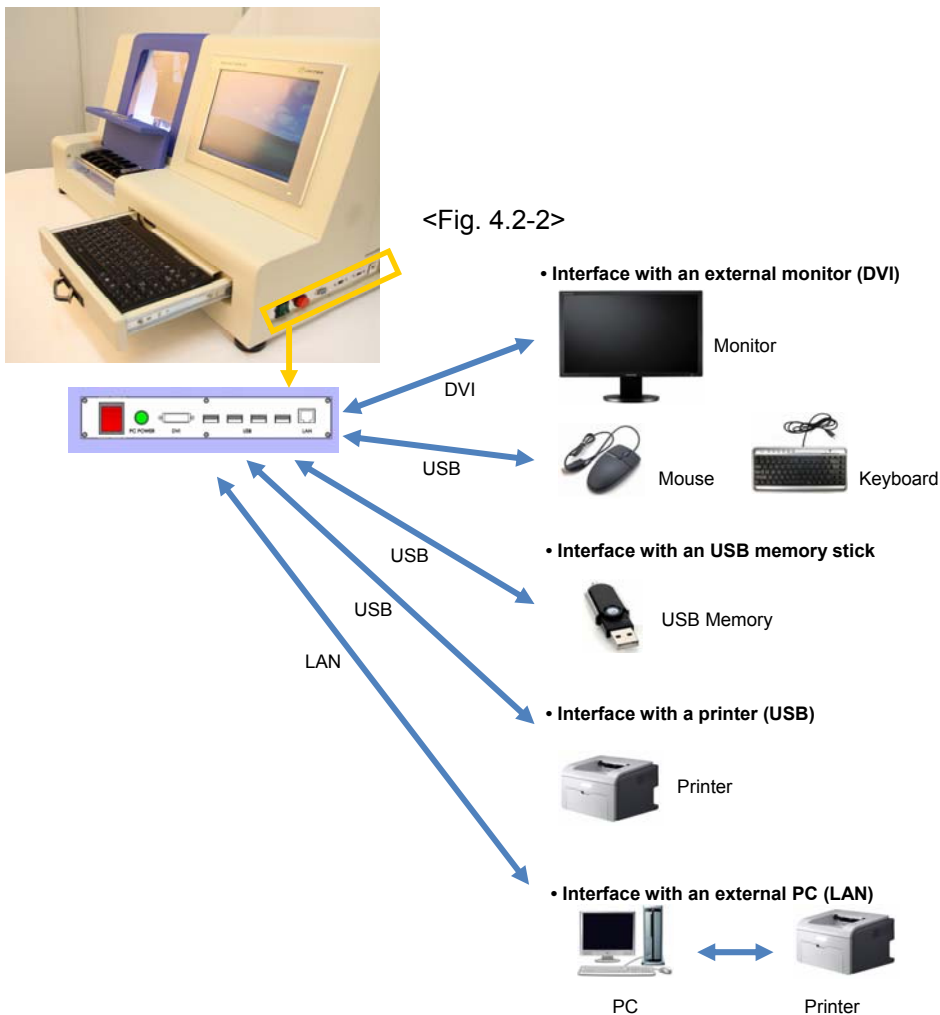


- Any electrical external devices interfaced with the instrument should be connected to ground

- **External device list**

- 1) Monitor with a DVI port
- 2) Mouse with a USB port
- 3) Keyboard with a USB port
- 4) USB Memory stick
- 5) Printer with a USB port
- 6) PC with a LAN port

- **Interfacing with the external devices**



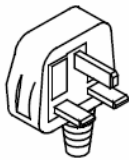
4.3. Connecting to main power

4.3.1. Connecting to main power supply

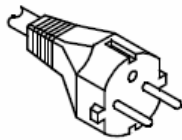


- A constant and stable AC power source supply to the instrument must be ensured at all times. Failure to comply with the above will cause severe damage to the instrument.
- Always use a grounded power cord. Do not use defective power cord.

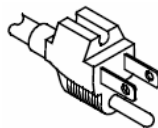
- 1) Set the AC power switch to the off position.
- 2) Refer to 'Power cords'. The line cord provided is matched to the country of origin by UNITMA.



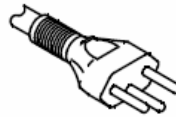
U.K.



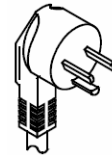
Europe



U.S.A.



Switzerland



Denmark

- 3) Connect the power cord (3m maximum) to the rear of the instrument, then to a suitable AC voltage source. Ensure that you have the correct line cord. See "3.3. Instrument specification".

4.3.2. Selecting the voltage of AC power source

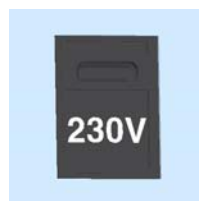


- Do not change the voltage of AC power without authorization from Unitma Co., Ltd.
- Contact a service engineer of Unitma Co., Ltd. for changing the voltage of AC power source.
- Before selecting the voltage of AC power of the instrument, verify if the voltage of AC power intended to use is same as the voltage of AC power source.

- 1) The instrument is free voltage power supply, but only PC power is selectable 115V/230 Voltage.
- 2) If the rear side cover is opened, it will be showed the below picture of selectable switch on the top area of PC computer and it can be adjusted according to the local supply voltage.



100V~120V



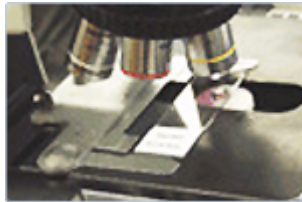
200V~240V

<Fig. 4.3-1>

5. General procedure of Tissue Microarray

5.1. Building TMA with Quick Ray Master

- 5.1.1. Place the reference slide and the donor block on microscope stage for marking the position with an oil pen.



<Fig. 5.1-1>

- 5.1.2. Punch the tissue specimen from donor blocks and deliver them into recipient blocks by using Quick Ray Master.

- 1) Place donor blocks tray and a recipient block tray on the Main plate in Quick Ray Master.



<Fig. 5.1-2>

- 2) Punch the tissue specimen from donor blocks and deliver the extracted tissues into recipient blocks by using Quick Ray Master.



<Fig. 5.1-3>

- 3) Disassemble the recipient block from recipient block holder tray in Quick Ray Master.

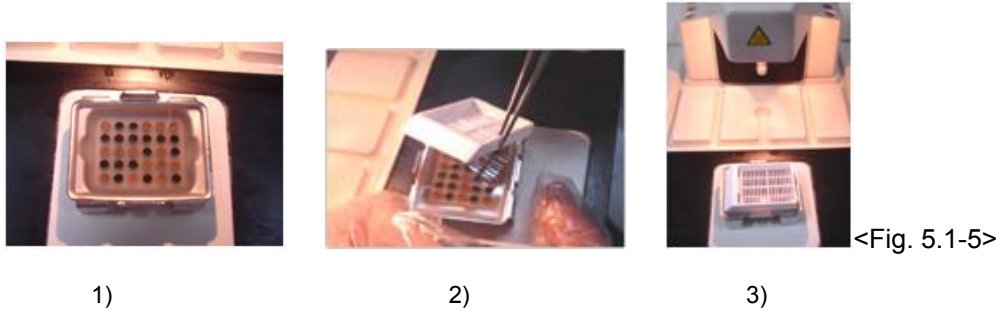
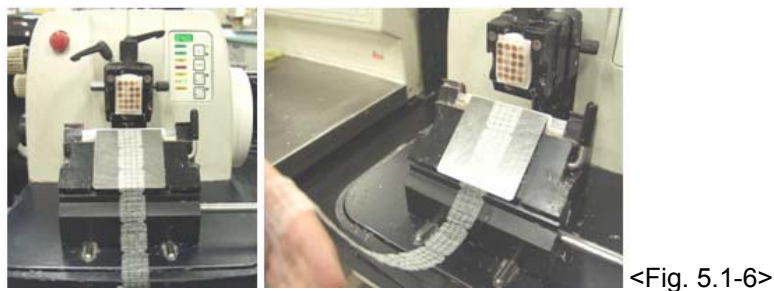
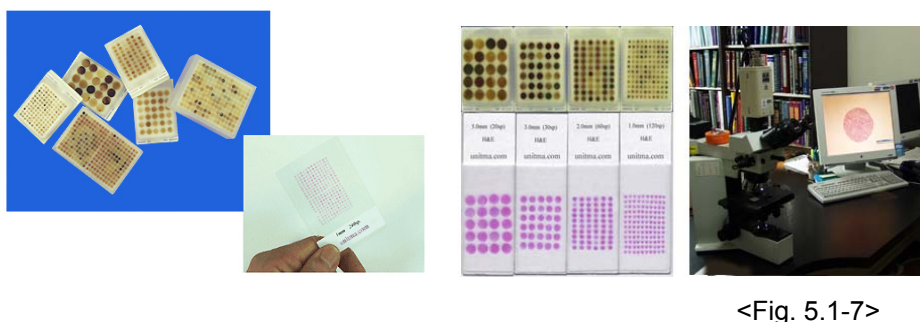
- 5.1.3. Put the recipient block into an embedding mold with the cutting section faced down and incubate it in an Oven at 60℃ for 30minutes.



<Fig. 5.1-4>

5.1.4. Embedding Process

- 1) Once the recipient block is completely transparent
- 2) Place the plastic cassette on top of this recipient block
- 3) Pour hot embedding paraffin on the plastic cassette

**5.1.5. Solidify the block in a cold plate.****5.1.6. Cut the block with the microtome. (About 4µm)****5.1.7. Block and slide completed**

5.2. Preparation for punching and inserting with Quick Ray Master

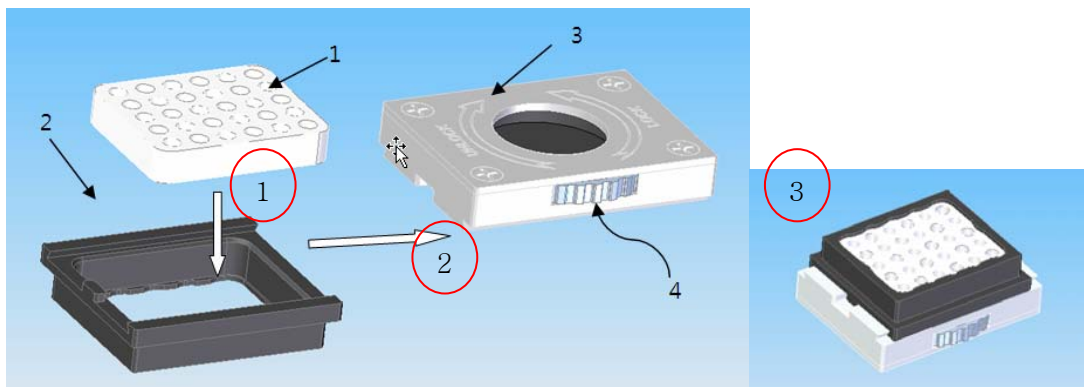


- Keep the front door of the instrument at a safe distance from your head and face.
- Be careful about your fingers or hand not to be scratched by the needle of tip when assembling or disassembling the puncher or block trays or the Main plate, or when cleaning the interior of the instrument or the tip.
- Be careful not to pinch your fingers when closing the front door of the instrument.

5.2.1. Fit donor blocks and a recipient block into the Main plate in Quick Ray Master.

5.2.1.1. Putting the recipient block into the recipient block holder.

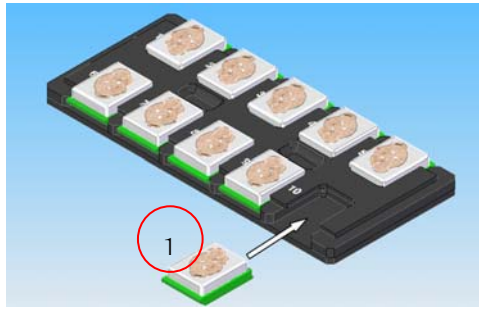
- 1) Putting the recipient block (1) into the recipient block holder top (2).
- 2) Fitting the recipient block holder top with the recipient block into the recipient block holder body 3.
- 3) Turns the adjust screw 4 to the lock direction for tightening up the recipient block 1 to recipient block holder top 2 to the end.
- 4) Fitted recipient block holder.



<Fig. 5.2-1>

5.2.1.2. Fitting the pre-marked donor block into the donor block tray.

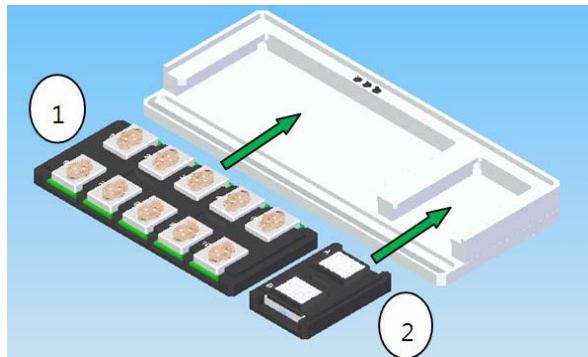
Points should be marked on the donor block with oil ink where the user intends to extract the sample tissue from and insert it into the donor block tray (the points should be marked at least 2 hours before the implementation for the oil ink dry up completely). The user can choose one of three colors - White, Red and Black which can be contrasted by the color of sample tissues. Please refer to the additional explanation shown as <Fig. 5.3-7>



<Fig. 5.2-2>

5.2.1.3. Putting the trays into the Main plate.

Putting the donor block tray 1 and recipient block holder tray 2 into the Main plate.



<Fig. 5.2-3>

5.2.1.4. Procedure of fitting the block trays into the Main plate of the instrument.

- 1) Turn on the system.
- 2) Start **"AUTO"** mode
- 3) Load spread sheet file and click on **"Set Tray"** button.
- 4) Open the tray door

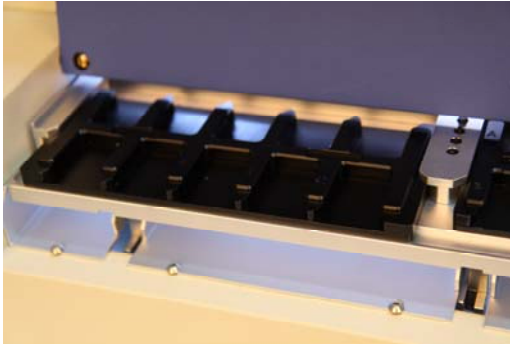


<Fig. 5.2-4>

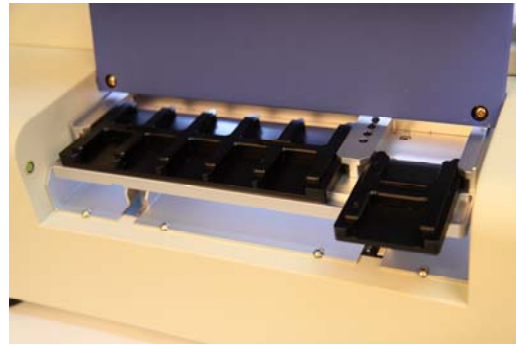
- 5) Put the donor block tray and recipient block holder tray into the Main plate of the instrument.



The jig in the main plate of the instrument should not be disassembled from the instrument.



<Remove donor block tray>



<Remove recipient block holder tray>



<Fig. 5.2-5>

<Fill the donor blocks and recipient blocks in each tray and put the trays into the Main plate>

6) Close the tray door.

5.2.2. Remove the recipient blocks from the Quick Ray Master.

- 1) Wait until the implementation of the instrument is completed or stopped. The user can hear a music sound from the instrument when the instrument stopped.
- 2) Open the tray door.
- 3) Take out the recipient block holder tray from the Main plate of the instrument.
- 4) Take out the recipient block holder from recipient block holder tray.
- 5) Take out the recipient block from recipient block holder.
- 6) After taking out the recipient blocks, replace the recipient block holder into the Main plate.
- 7) Close the tray door.

5.3. Operation of the instrument

5.3.1. Start and stop of the program



<Fig. 5.3-1>

5.3.1.1. Start

When the “**UATM.exe**” on the base screen of Window XP is double clicked, the Quick Ray UATM-272 program starts to implement as shown in <Fig. 5.3-1>

5.3.1.2. Stop

When the “**EXIT**” is clicked, the program is stopped. And then turn off the computer and consequently turn off the instrument by the main power S/W.

5.3.2. Operation Procedure

5.3.2.1. DEMO

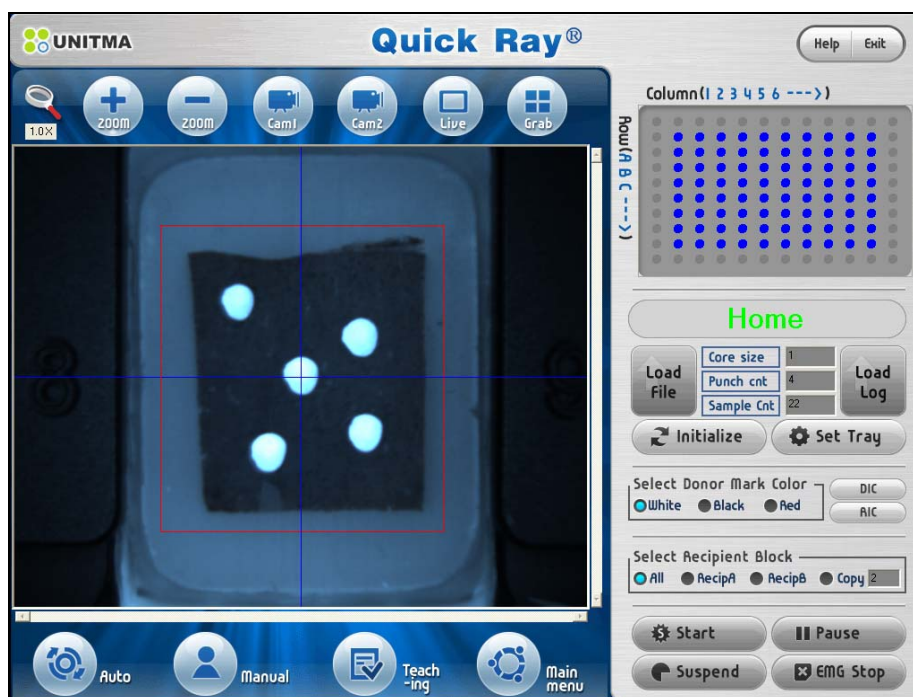
This function is to show the simple operation without the execution of the originally intended work. When the “**DEMO**” is clicked, the instrument starts to show all procedures without extracting and inserting the sample tissues for helping the users’ understanding.



<Fig. 5.3-2>










5.3.2.2. AUTO




When the “**AUTO**” is clicked, the screen is changed as shown in <Fig. 5.3-3>.










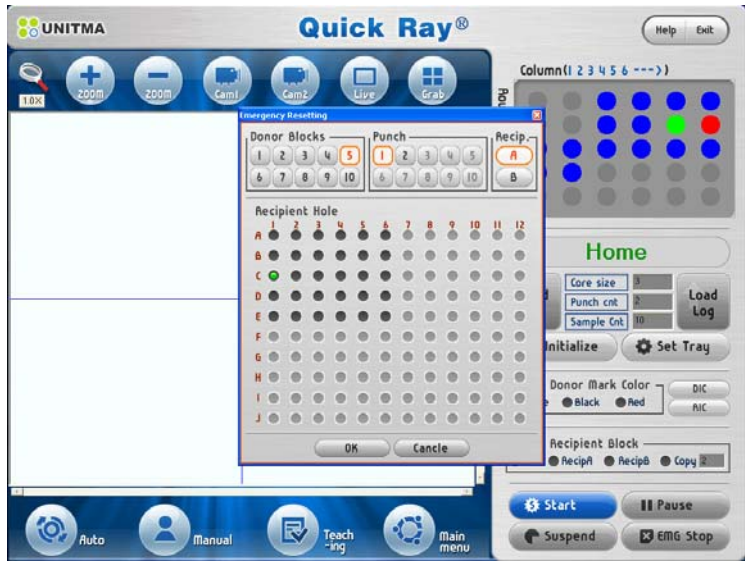

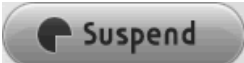

<Fig. 5.3-3>

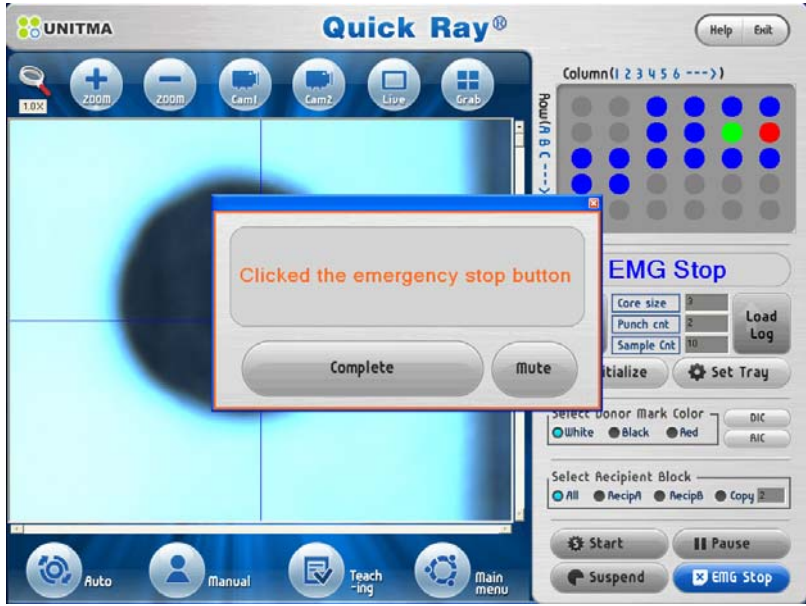


5.3.2.2.1 Function of each button

Button	Description of function	
ZOOM +		To expand the suspension image to be expanded up to 5.0 times by increase in 0.5 at a time. The 1.0 time is the current window screen based on 0.5 time of the actual camera resolution.
ZOOM -		To reduce the suspension image to be reduced to 1.0 time by decrease in 0.5 at a time.
CAM1		To capture the donor block images with the camera 1.
CAM2		To capture the recipient block images with the camera 2.
Live		To convert a suspended image to a live one.
Grab		To acquire a suspended image from a live one.
Auto		To activate the menu with the button at the right side of the screen for loading a file, initializing and starting the process and others.
Manual	 Manual)	To implement each procedure step by step manually in case of failures in recognizing the marks on the donor block and the hole position of the recipient blocks during the automatic execution (Refer to section 5.3.2.2.3.
Teaching		In case of failure in recognizing the mark of donor block during the automatic execution, the users can appoint the area intended to extract the sample tissue on the Donor block and then press the "OK " button to return Auto mode. In another case of failure in recognizing the hole position of recipient block during the automatic execution, the users can manually select the hole intended to insert the sample tissue (Refer to section 5.3.2.2.4. Teaching).




Main Menu		To move to the main menu
Help		To provide a few tips to help the user's operation
Exit		To exit from the program

Button	Description of function	
Load file		To download the Excel data file for the saved information of donor blocks, Core size, Punch count, Sample count and others.
Load log		In the event that the “Suspend” button is clicked to stop the program, this button function is to start again to download the data used previously.
Initialize		To undertake the function to find the original position of each axis motor.
Set Tray		To move the main plate to the tray door for each donor block or recipient block to be replaced.
Select the mark color on Donor blocks		To select the color to be marked the desired point on the donor block. One color can be selected from white, black and red, and the color of donor blocks in an Excel file has to be marked with the same color. In case the cassette color is white, please make sure of avoiding selecting white color on the donor blocks. In case the instrument fails in differentiating between the colors on the donor blocks and the colors at the bottom of vacant donor block hole extracted the sample tissues, the program will stop to return to “Teaching” Mode.
Select the Recipient Block		<p>All: UATM-272 is designed to load two recipient blocks simultaneously, and the tissues are inserted in the sequence of (A, 1), (A, 2), and (A, 3) of recipient block A, and when the insertion up to (N, N) is completed, it moves to insert at (A, 1) of recipient block B. Please make sure that two recipient blocks shall be the same whole size.</p> <p>Copy: The tissue extracted from the same donor block can be inserted in the same location of each different recipient blocks. For example, the sample</p>

	<p>collected from the first donor 1 is inserted in the location of (A, 1) of recipient block A, and the tissue collected from the second donor block 1 has to be inserted to the location of (A, 1) of recipient block B. At this time, the punch count must be even number.</p> <p>RecipA: To insert the sample tissues into the only recipient block A. If a recipient block A is inserted completely, replaced the recipient block A with new one to continue its execution.</p> <p>RecipB: To insert the sample tissues into the only recipient block B. If a recipient block B is inserted completely, replaced the recipient block B with new one to continue its execution.</p>
Start	<p> To implement the serial process of sample tissues extraction and insertion. When the user presses the “EMG Stop” at the emergency situation and wants to restart, the following pop-up will be displayed on the window.</p>  <p style="text-align: right;"><Fig. 5.3-4></p> <p>When the “OK” button <Fig. 5.3-4> is clicked after defining the donor block, punch count, recipient block, and location of recipient block hole, the process is re-implemented.</p>
Pause	<p> To stop temporarily</p>
Suspend	<p> To suspend the program. After completing a series of extraction and insertion of the sample tissues, the log file will be prepared and saved automatically. To restart the program later, the “Load log” button is used to load the saved data.</p>
EMG Stop	<p> In case the users meet any abnormal situation, the user can press “EMG Stop” to stop the program with the music sound, then click the “Complete” button to initialize the original position automatically.</p>

	 <p style="text-align: right;"><Fig. 5.3-5></p>
RIC	 If the user presses this button to confirm the insert status on the recipient block, and if the hole does not have the tissue inserted, the color of the recipient block hole on the right upper part of the screen turns from green to red, and the error message is shown on the Excel data file at the same time.
DIC	 If the user presses this button to confirm the extract status from the donor block, the user can check if the donor block is lifting entirely or cracked. In this case the instrument returns to “Pause” stage with pop-up message box.

5.3.2.2.2. Program implementation

Sequence	Description
Program implementation	<p>Turn on the main power switch on the right side of the instrument</p>  and then  Turn on the power switch for PC. <p>Wait until the window booting is completed and click</p>  on the base screen of window.

Finding the position to initialize



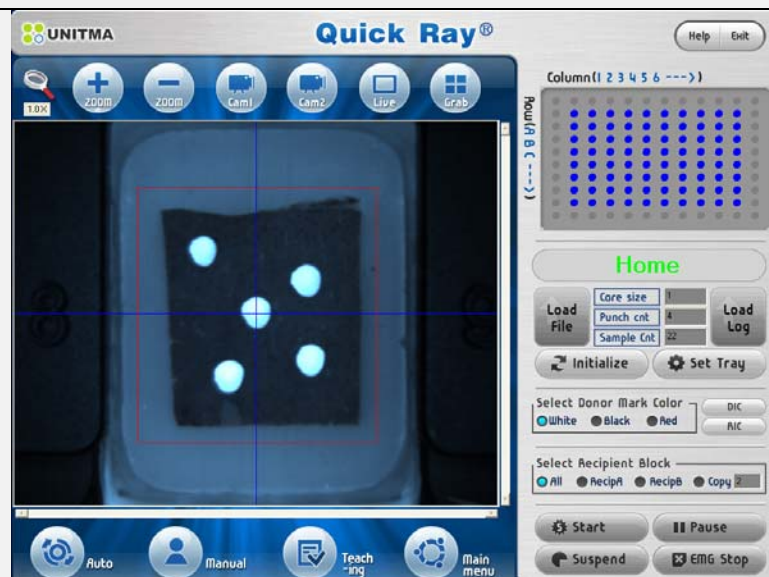
<Fig. 5.3-6>

When the program is loaded as shown in <Fig. 5.3-6>, the finding initial position is implemented together.



Press the button to implement the finding initial position.

AUTO mode



<Fig. 5.3-7>

Click the “**AUTO**” button from the main menu to turn the above screen.

Load the file



Load the data file for the donor block input in advance. Following figure <Fig. 5.3-8> is the example of the data file. Core size, sample count, and punch count should be accurately defined, and the applicable donor block data is prepared accordingly.

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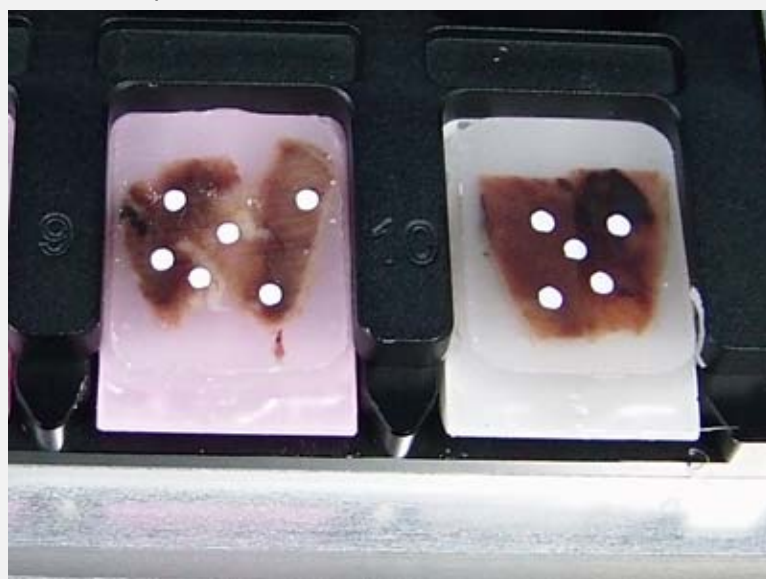


<Fig. 5.3-9>

When the main plate is positioned at the tray door, the user has to take out the donor block tray and the recipient block tray from the Main plate. Then, put the pre-marked donor blocks into the donor block tray and put the prepared recipient block holder into the recipient block tray. And then, fit the donor block tray and the recipient block holder tray into the main plate.

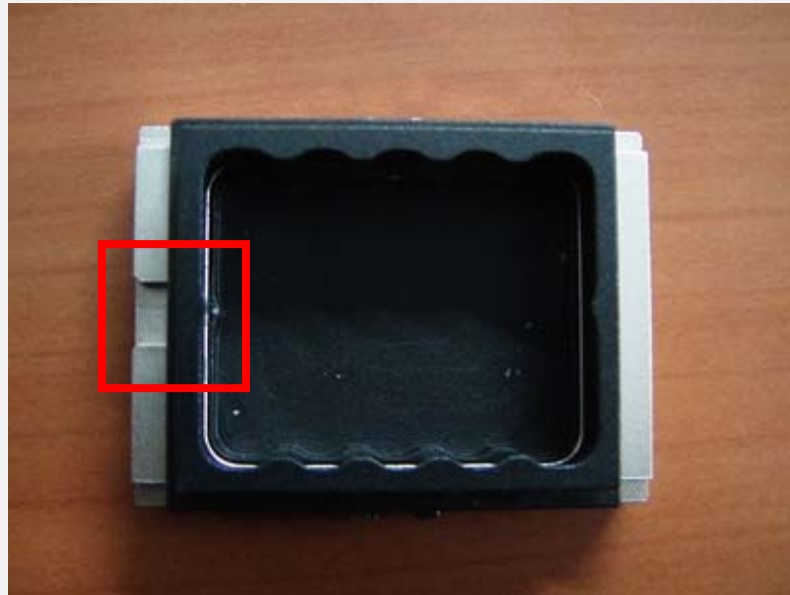
The user has to mark the desired area to be extracted from the donor blocks at least 2 hours before putting the donor blocks into the donor block tray.

If the marking ink is not dried up completely, it may cause in non-insertion of the extracted sample tissues.



<Fig. 5.3-10>

The above figure <Fig. 5.3-10> shows the white marker to display the desired position to be extracted.



<Fig. 5.3-11>

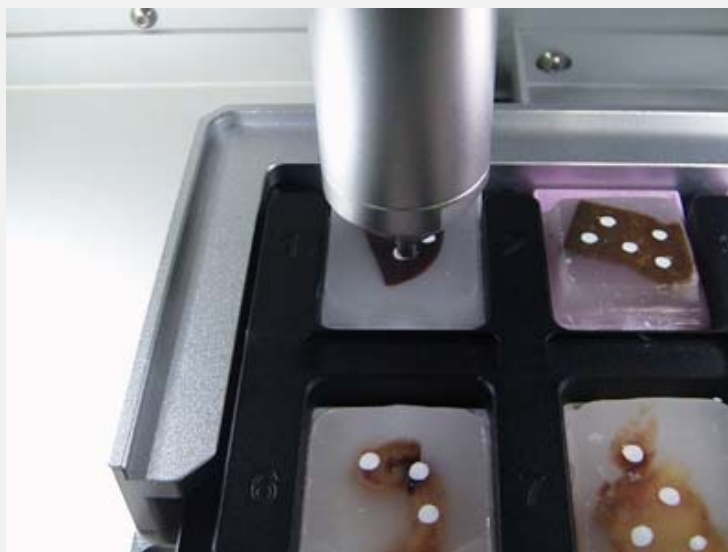
As shown on the figure <Fig. 5.3-11>, when the user put the recipient block into the recipient block holder, the user has to be careful about the direction to meet the left odd on the holder body. (see the <Fig. 5.2-1> for more details)



<Fig. 5.3-12>

	The above figure <Fig. 5.3-12> shows the condition loaded all blocks.
Start	<p>To implement the process as programmed.</p> <div data-bbox="1037 392 1308 465" data-label="Image"> </div> <p>1. When using the new recipient block, it has the function to mark the position of the first hole that uses 1mm tip to easily confirm the recipient block direction. Following figure <Fig. 5.3-13> shows the location with the mark. The indicated location is set automatically in meeting the size of the hole.</p> <div data-bbox="464 732 981 1008" data-label="Image"> </div> <div data-bbox="1163 1008 1343 1043" data-label="Caption"> <p><Fig. 5.3-13></p> </div> <p>Following figure <Fig. 5.3-14> shows the direction on the recipient block.</p> <div data-bbox="501 1164 1276 1747" data-label="Image"> </div> <div data-bbox="1109 1774 1287 1812" data-label="Caption"> <p><Fig. 5.3-14></p> </div> <p>2. In order to extract the marked tissue from the donor block, the instrument recognize the mark on the donor block and pick the sample tissues, and deliver the extracted tissues into the correspondent hole of the recipient block automatically. Following figure <Fig. 5.3-15> shows the condition</p>

when the tip is descended during the process of extracting the tissue.



<Fig. 5.3-15>

Following figure <Fig. 5.3-16> shows the descending condition of the tip and needle during the insertion process on the recipient block.



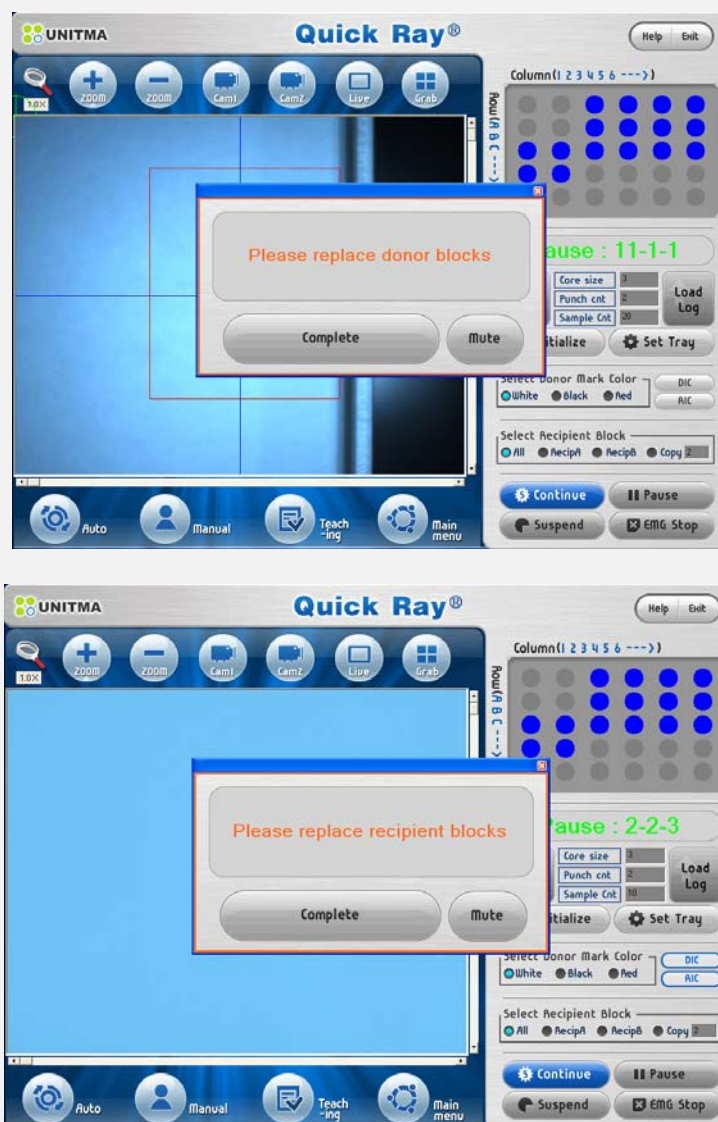
<Fig. 5.3-16>

3. After completing the process, The ID of donor sample tissues extracted earlier is prepared on the applicable location of the Excel sheet made with the same shape as the recipient block for completing one step.

Block
replacement

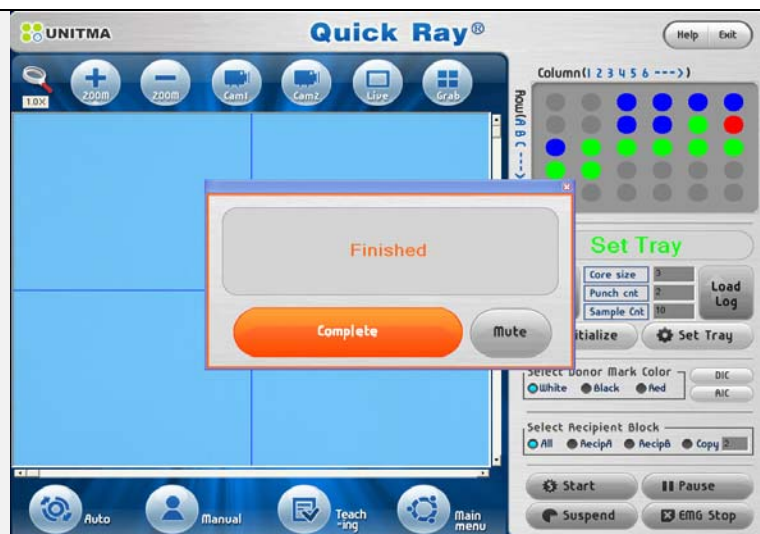
During the process implementation, in the event that the donor block or recipient block is used up, the messenger window shows to replace the blocks as shown in the below <Fig. 5.3-17>. At this time, the main plate will move to the tray door for easy replacement of the blocks. After replacing the donor block or recipient block, click the "**Complete**" button on the alarm messenger window and click the "**Continue**" button from the screen, the

process would be implemented continuously.



<Fig. 5.3-17>

Finished



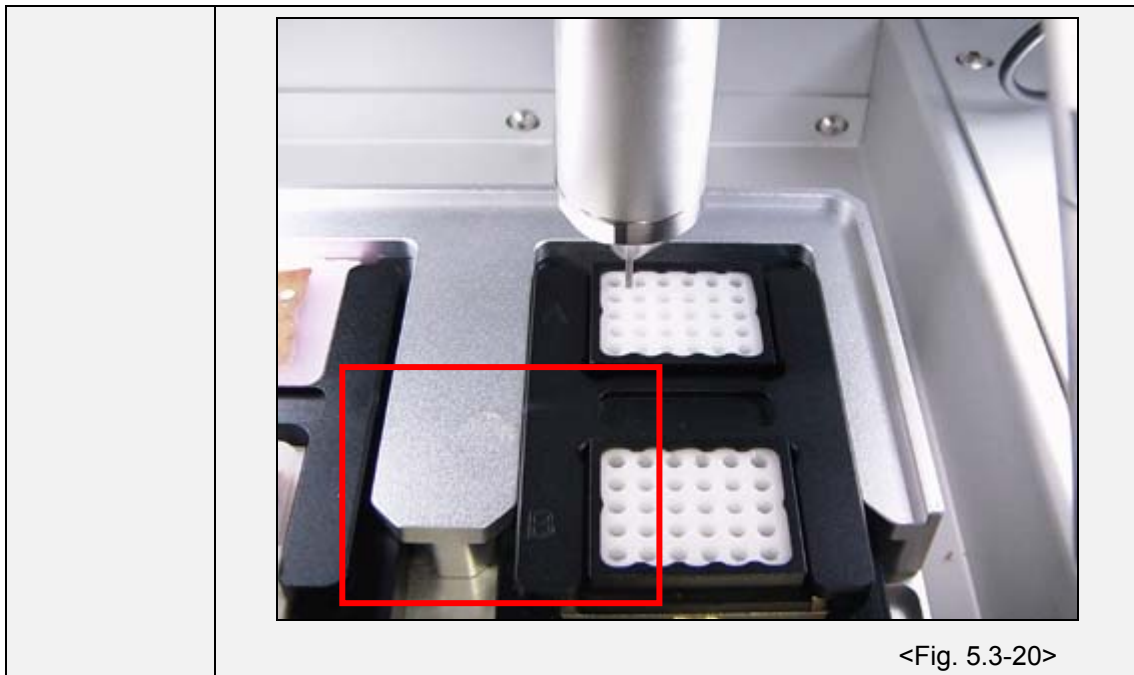
<Fig. 5.3-18>

And then, when all extraction and insertion processes are completed, it has the alarm messenger window <Fig. 5.3-18> to indicate the process completion. <Fig. 5.3-19> shows the result of completion for the TMA process.



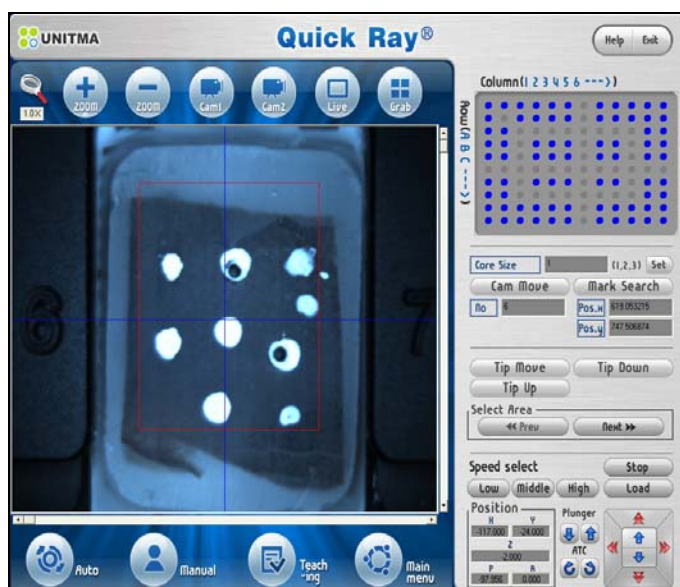
<Fig. 5.3-19>

The data of block completed with the work has the same type with the recipient block shape as shown in the following <Fig. 5.3-20>, and it is saved in the Excel file including the tissue ID inserted in the hole of recipient block.

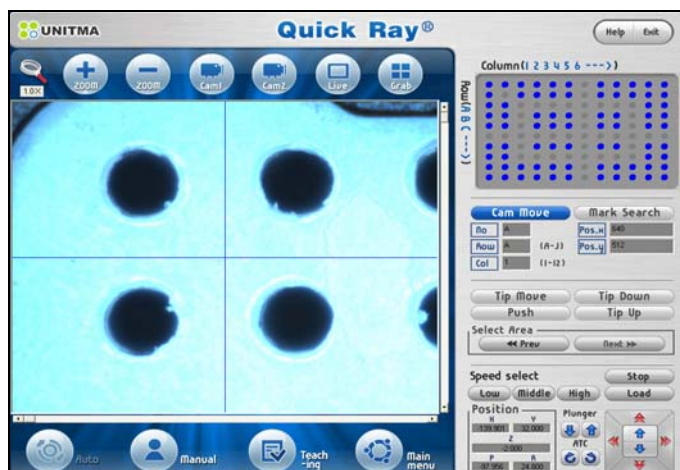


5.3.2.2.3. Manual






When the **"Manual"** button is clicked, the screen changes as in <Fig. 5.3-21>. The user can operate the instrument step by step manually for all procedures as implemented by **"AUTO"** mode. At this time, the data has to be saved on the Excel file separately, the marking of recipient blocks, **RIC** and **DIC** would be excluded. The **"Manual"** mode is configured with a total of 2 pages, and Manual page 1 undertakes the motion related to the donor block and Manual page 2 undertakes the motion related to the recipient block. It is useful, in the event, that the device fails in recognizing the marks on the donor blocks or in extracting the sample tissues from the donor blocks during the execution at the **"AUTO"** mode. In addition, since the each motion of the **"AUTO"** mode is implemented by each step so that it is great to understand the sequence and concept of the entire process. However, in the event that the unskilled person follows this procedure, it may cause damage to the instrument so that the user undertakes carefully.











<Fig. 5.3-23> Manual page 1

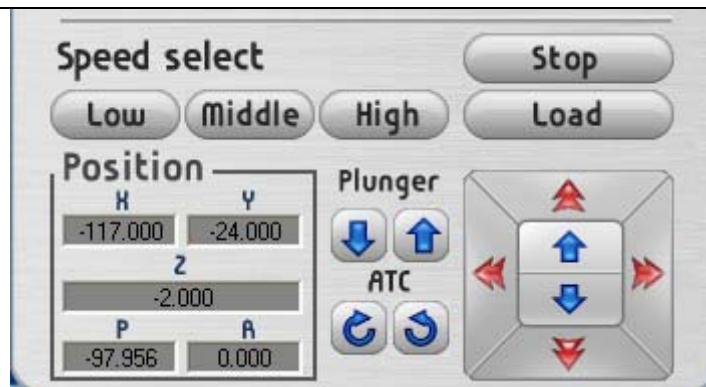


<Fig. 5.3-24> Manual page 2

Button	Description of function
Set	 To save the value after selecting the “ Core Size ”. Each core size is met with the same sized tip. (Manual page 1)
Cam Move	 To move camera to focus on the selected donor block. (Manual page 1)
	 To move Camera to focus on the selected hole of the recipient block. When all processes are over, press this button again to confirm the condition of the current work. (Manual page 2)
Mark Search	 To find the mark in the selected “ ROI (Region Of Interest) ”. Marks found in size sequence is modified by the value of Pos.x and Pos.y . In addition, the user can choose the position to extract the sample tissues by using the mouse. (Manual page 1)
	 To find the median value of the hole registered from the “ Marker Param ” set in advance. In addition, the user can choose the position to be inserted on the recipient blocks by using

	the mouse. (Manual page 2)
Tip Move	 If the values of Pos.x and Pos.y are within the “ROI” area, the tip can be moved to the position of value area. When the position value is deviated from the “ROI” area, the error message shows that the tip cannot reach the area. This is to prevent damage of the tip which may occur in the event that the mistaken location is read. In this case, press the “ Cam Move ” button again then it will search the mark again. (Manual page 1) If the values of Pos.x and Pos.y are within the (100, 100, 1180, 924) area, the tip moves to the position value area. When the position value is outside of this area, the error message will appear that the tip can not reach the area. This is to prevent the damage of the tip that may occur in the event that the mistaken location is read. In this case, press the “ Cam Move ” button again to make the mark search. (Manual page 2)
Tip Down	 The tip is coming down to the cassette surface to extract the sample tissues from the donor block. At this time, the user should be careful about checking the tip position to prevent the damage to the tip before pressing the button. (Manual page 1)
	 The tip is moved to the surface of the selected hole on the recipient blocks. At this time, the user should be careful about checking the tip position to prevent the damage to the tip before pressing the button. (Manual page 2)
Push	 To insert the extracted tissue into the recipient block hole. (Manual page 2)
Tip Up	 The tip positioned on the cassette surface is lifted up to make the next motion. (Manual page 1)
	 After finishing the tissue insertion, the tip positioned on the recipient block surface is lifted up to make the next motion. (Manual page 2)
Prev	 To move to the Manual page 1. And, it is inactive on Manual page 1.
Next	 To move to the Manual page 2. And, it is inactive on Manual page 2.

Motion
Controller

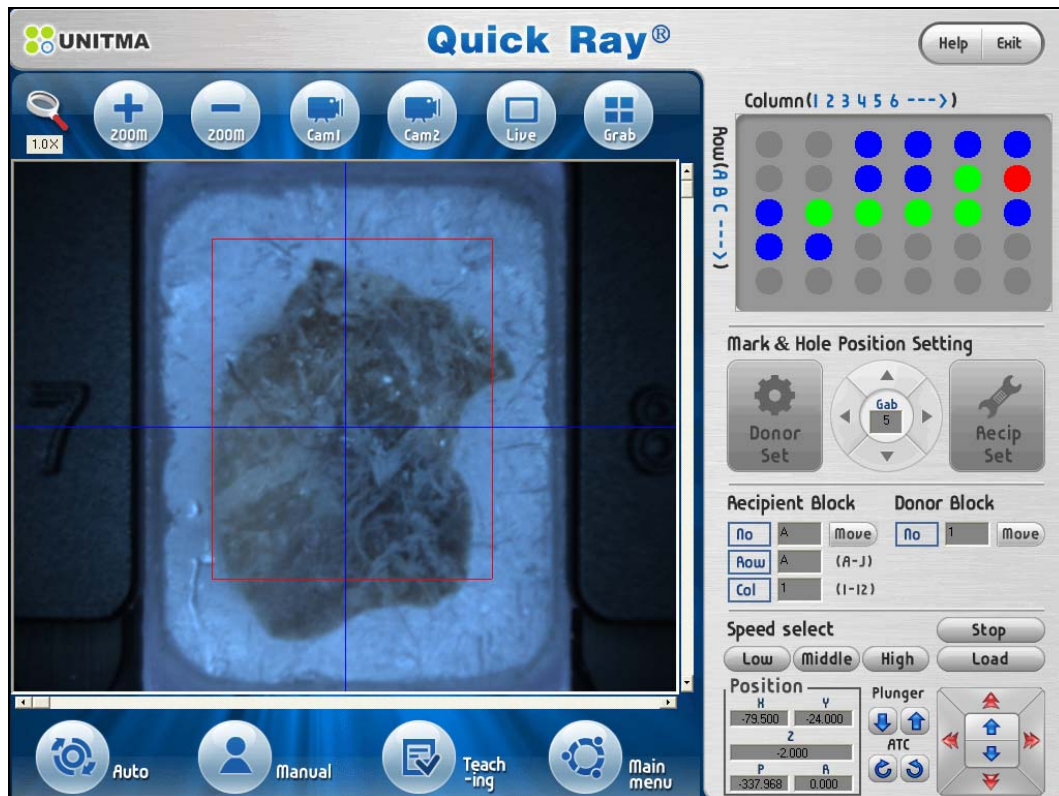


<Fig. 5.3-23>


This part <Fig. 5.3-23> is the motion controller. "**Speed select**" is to apply the speed set at the "**Set**" mode. "Position" displays the position of each axis. The plunger tip controls the needle. "**ATC**" may modify the rotation position of the tip. The "**Red arrow**" button may control the X and Y axis, and the "**Blue arrow**" button located in the middle of the X and Y axis controls the Z axis for Cam 1, Cam 2, and Tip. "**Stop**" button is to suspend all motions not intended.



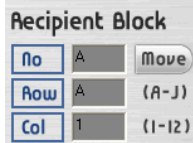
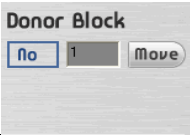

5.3.2.2.4. Teaching

When the “**Teaching**” button is clicked, the screen is changed as shown in <Fig. 5.3.24>. In addition, in the event that mark finding is failed during the process implementation, and when the location of the mark is set by the user definition, the screen is changed as follows



<Fig. 5.3-24>

Button	Description of function
Donor Set	 <p>This button is always inactivated when clicking the “Manual” button, whereas, it is activated when failing to read the donor block mark during the process. At this time, the user can choose the position to extract the tissue on the donor blocks. The user can choose the desired position with the mouse or the direction key located in between the “Donor Set” button and the “Recipient Set” button.</p>

Recip Set	 <p>This button is also always inactivated at the time of clicking "Manual" button, whereas it is activated when failing to read the recipient block hole during the process. At this time, the user can choose the position to extract the tissue on the donor blocks. The user can choose the desired hole with the mouse or the direction key located in between the "Donor Set" button and the "Recipient Set" button.</p>
Direction key	 <p>This button is used to set the mark location of donor or the center of the recipient block hole. This is the button to adjust the location properly rather than by the touch screen. After the user set the location with the touch screen, the user may adjust the location in more detail by using this button. The "Gab" in the direction key displays the number of pixel moved by pressing each time.</p>
Recipient block	 <p>Press the "Move" button as in the Manual mode to move to the location of the desired recipient block hole.</p>
Donor block	 <p>Press the "Move" button as in the Manual mode to move to the location of the desired donor block.</p>
Motion controller	 <p style="text-align: center;"><Fig. 5.3-25></p> <p>This part <Fig. 5.3-25> is referred to as the motion controller. "Speed select" is to apply the speed set at the "Set" mode. "Position" displays the position of each axis. The plunger tip controls the needle. "ATC" may modify the rotation position of the tip. The above "Red arrow" button may control the X and Y axis, and the "Blue arrow" button located in the middle of the X and Y axis controls the Z axis for Cam 1, Cam 2, and Tip. "Stop" button is to suspend all motions not intended.</p>

5.3.2.2.5. Main Menu

Press the “**Main Menu**” button to move to the initial screen of the program <Fig. 5.3-28>



<Fig. 5.3-28>

5.3.2.3 SET

When the “SET” button is clicked, the screen is changed as in the following <Fig. 5.3-27>; and all parameters of the instrument can be set.



<Fig. 5.3-27>

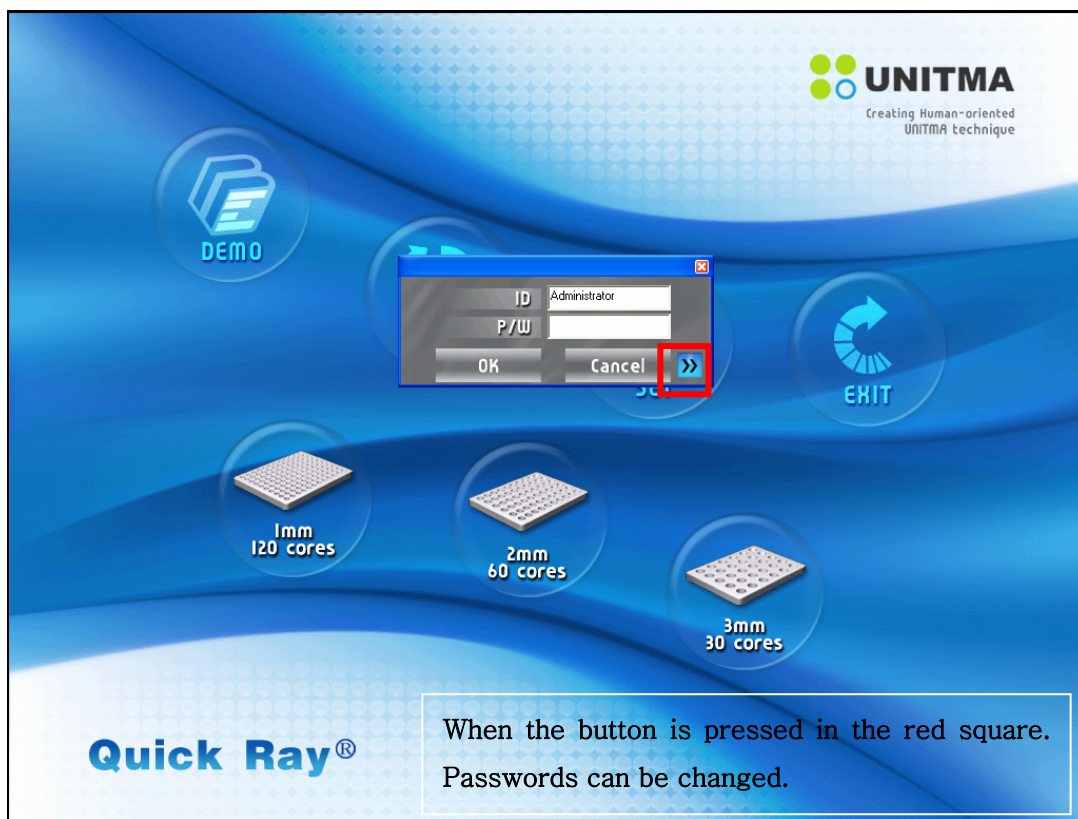
The user can input the ID with password for all the limited access. At the time of delivering this instrument to a customer, "Administrator" is an ID set with P/W of "A". P/W may be changed by the touch key board as shown in <Fig. 5.3-28> and <Fig. 5.3-29>. After inputting P/W and pressing the “OK” button, the above screen <Fig. 5.3-29> will appear.



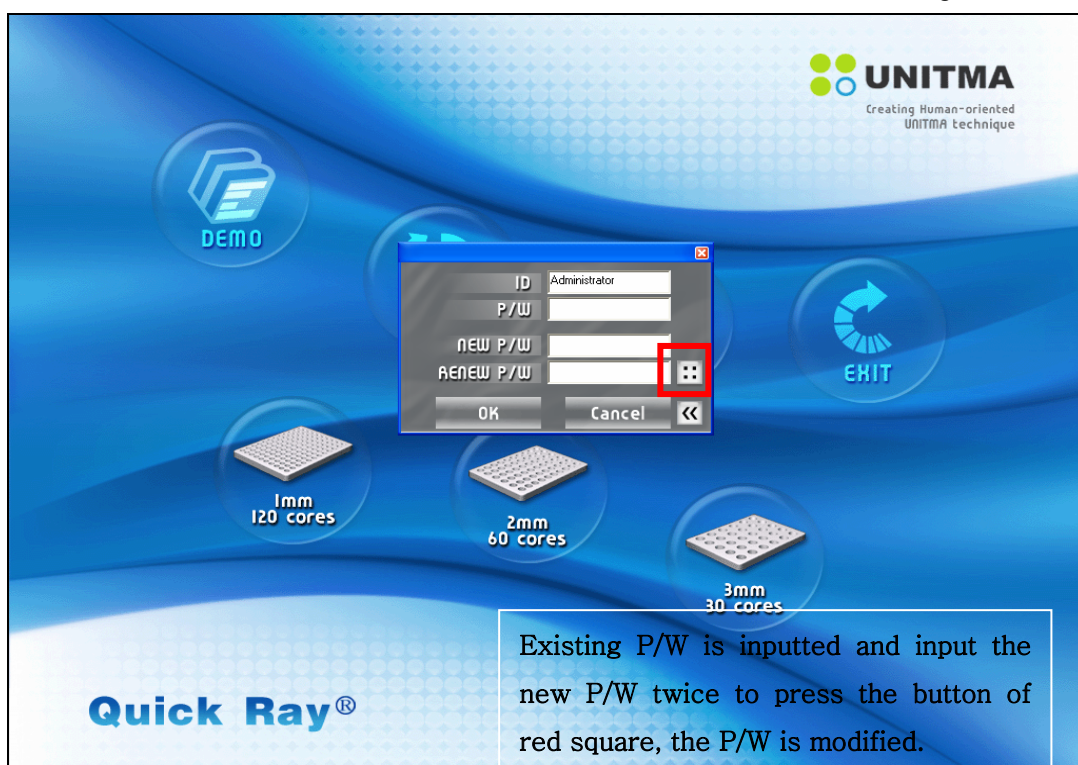
<Fig. 5.3-27>



<Fig. 5.3-28>

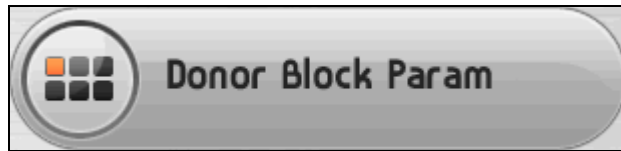


<Fig. 5.3.-29>

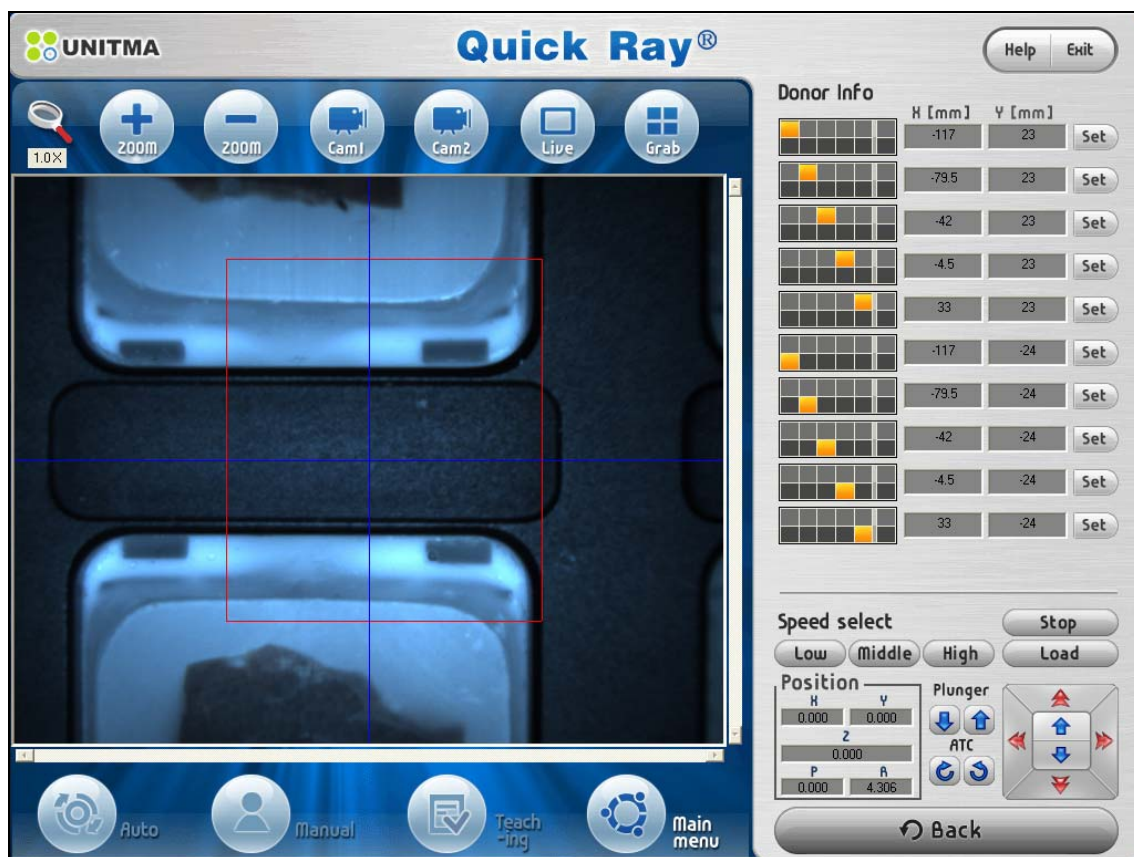


<Fig. 5.3-31>

5.3.2.3.1. Donor Block Parameter



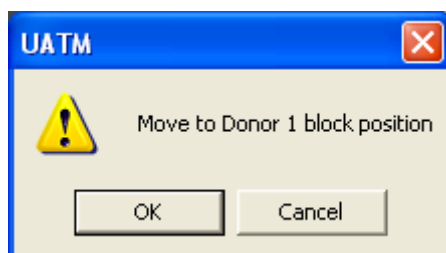
When the “Donor Block Param” Button is clicked, following screen<Fig. 5.3-30> appears. This may define the location of each donor block.



<Fig. 5.3-30>

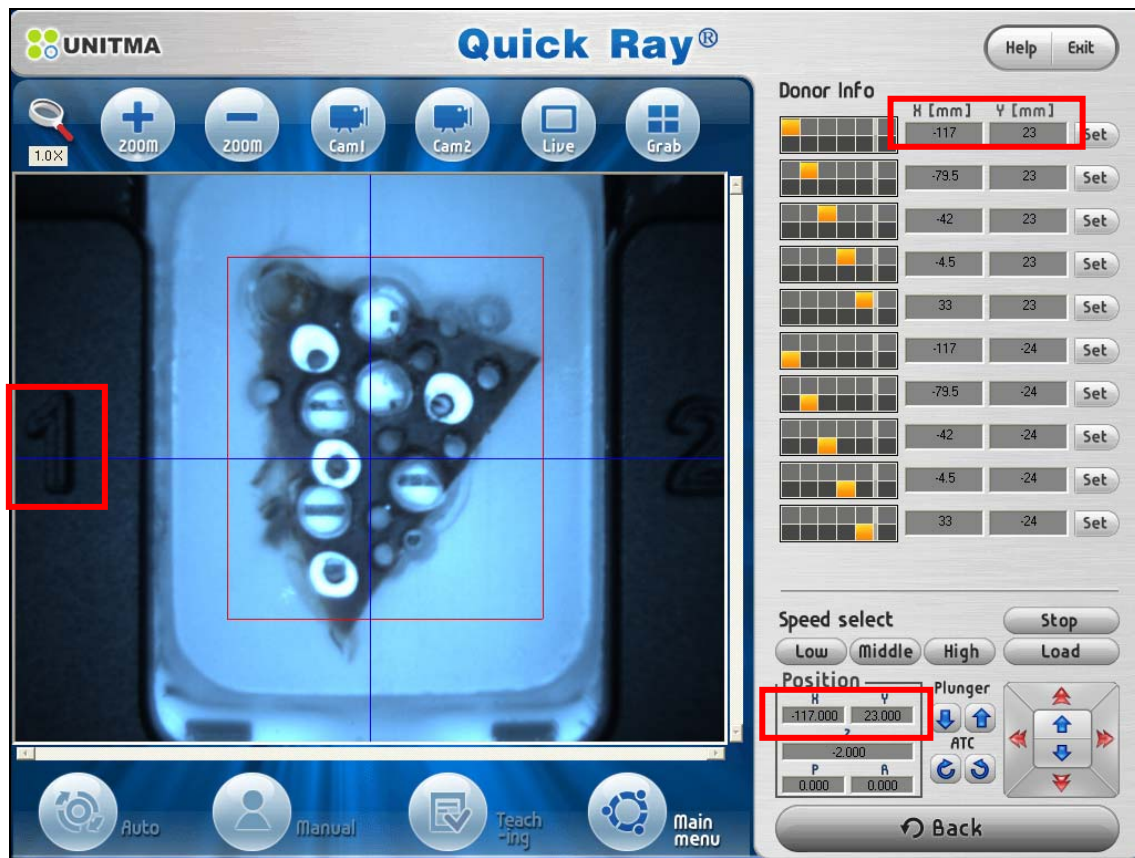


When the button is clicked, following messenger box is displayed<Fig. 5.3-31>



When the “OK” button is pressed, the camera moves to the position of donor block 1 and if the “Cancel” button is pressed, no motion will be made.

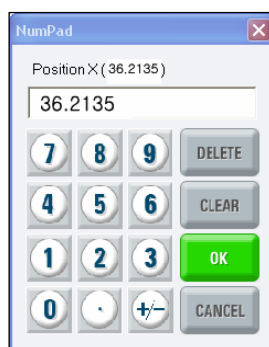
<Fig. 5.3-31>



<Fig. 5.3-32>

As above <Fig.5.3-32>, the location can be set and modified by using the next **X** and **Y** values with the unit of mm.

Each of **X** and **Y** values display the location at the original point found. In order to change the value, click the left text box to have the Key pad(NumPad) to show<Fig. 5.3-33>.



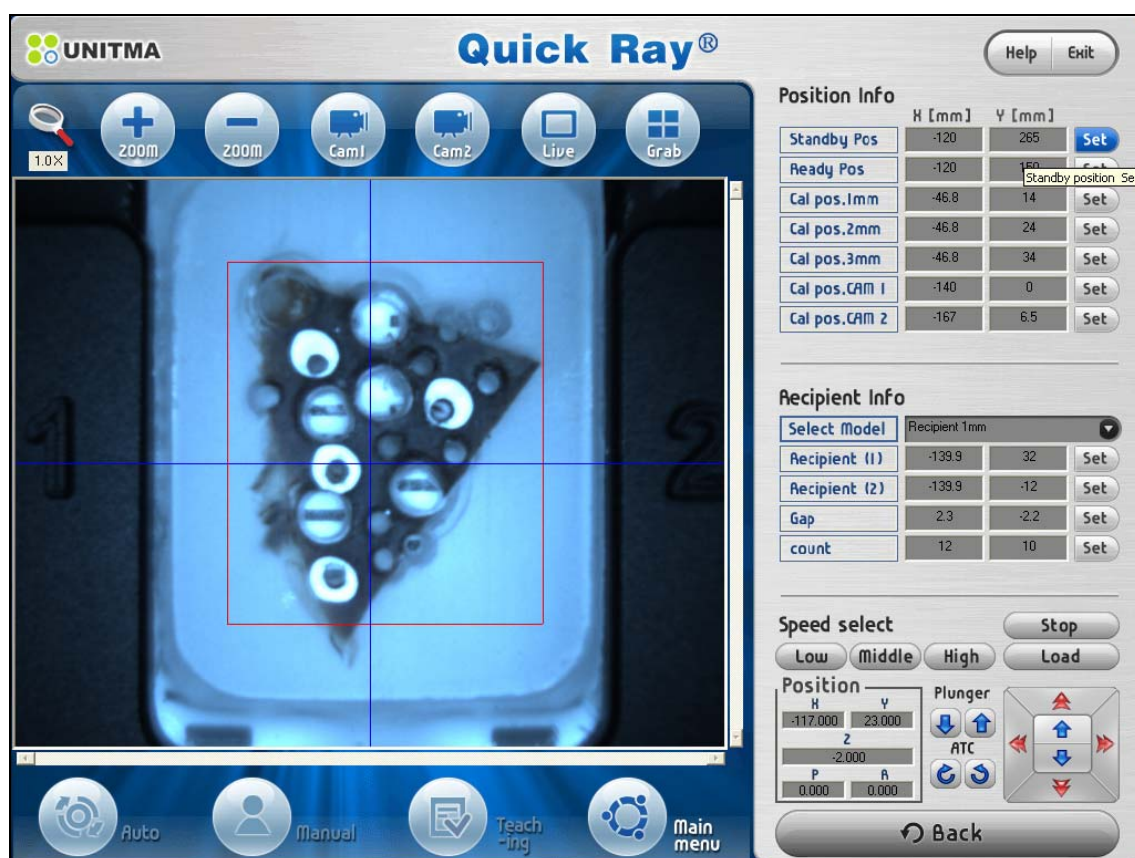
With the NumPad, input the desired location value and press OK button, then the NumPad is disappeared and the input number is copied on the Text box. In order to apply it, the Set button on the right has to be pressed.

<Fig. 5.3-33>



5.3.2.3.2. Recipient Block Parameter

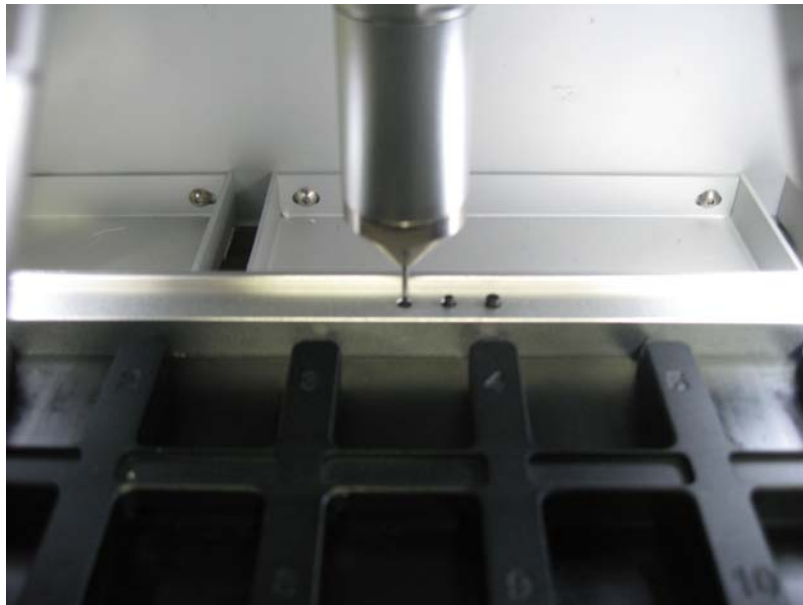


When the “**Recipient Block Param**” button is clicked, the following screen <Fig. 5.3-34> is appeared. The user can define the location of each recipient block.



<Fig. 5.3-34>

Button	Description of function
Standby Pos	<p>The location can be designated when replacing the so-called “Set Tray”, Donor block or Recipient block hole. When this button is clicked, it moves to the designated location<Fig. 5.3-37>. The location may be modified by using the touch pad, and make sure to press the “Set” button to save the location modified.</p>  <p style="text-align: right;"><Fig. 5.3-37></p>
Ready Pos	<p>When the tip is replaced, the location can be designated. When this button is clicked, it moves to the designated location. The location may be modified by using the touch pad, and make sure to press the “Set” button to save the location modified.</p>
Cal pos.1mm	<p>When calibrating, the end part of the Tip would come to the center of the calibration mark area by designating the location to measure the distance between each camera and tip. When this button is clicked, it moves to the designated location. The location may be modified by using the touch pad, and make sure to press the “Set” button to save the location modified.</p> 
Cal pos.2mm	
Cal pos.3mm	



<Fig. 5.3-38>

-> This above picture <Fig. 5.3-38> shows the Tip calibration position within the instrument when the “**Cal pos.1mm**” button is clicked.

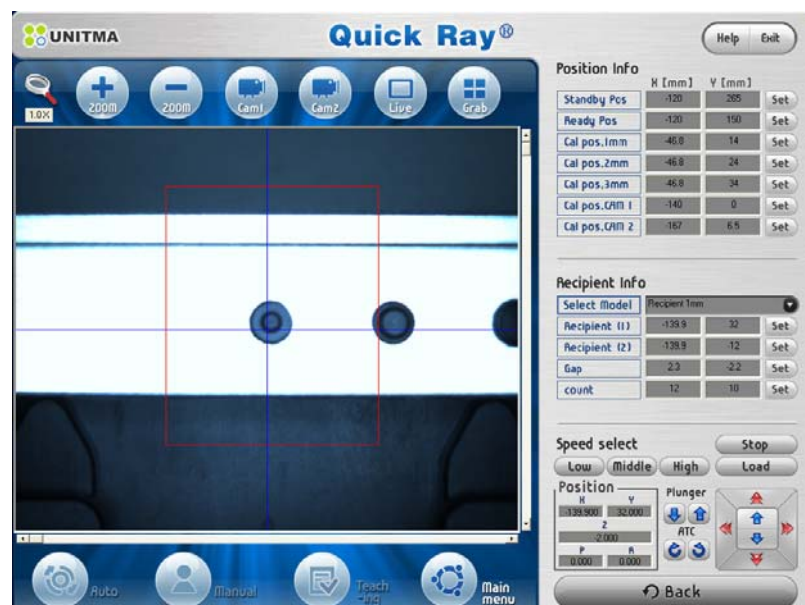
Cal pos.CAM 1

When the calibration of Camera 1 is made, the location can be designated. When the 1mm tip location is set, 2 and 3mm (approximately 10mm distance from each other) is set automatically. When this button is clicked in the following figure, it moves to the designated location. The location may be modified by using the touch pad, and make sure to press the “Set” button to save the location modified.



<Fig. 5.3-39>

-> This above picture <Fig. 5.3-39> is camera 1 position within the instrument when the "Cal pos.CAM 1" button is clicked.

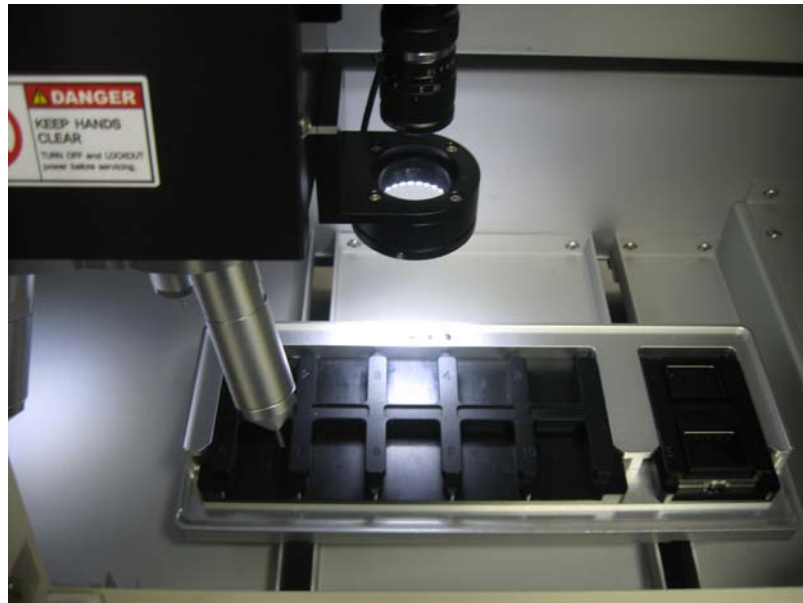


<Fig. 5.3-40>

	<p>-> Screen <Fig. 5.3-40> shows captured image when the button is clicked. Calibration 1mm Mark is made to move to the central part of the CAM 1 screen.</p>
--	--

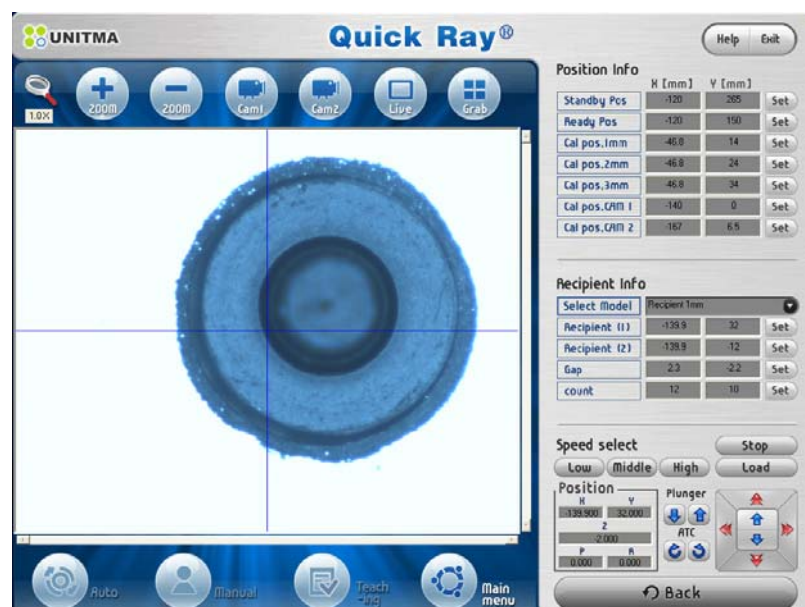
Cal pos.CAM 2

When the calibration of Camera 2 is made, the location can be designated. When this button is clicked in the following figure <Fig. 5.3-41>, it moves to the designated location. The location may be modified by using the touch pad, and make sure to press the “Set” button to save the location modified. As in the above figure, the tip has to be located around the center of the calibration mark.



<Fig. 5.3-41>

-> This above picture <Fig. 5.3-41> is Tip calibration position of inside of instrument when the “Cal pos.2mm” button is clicked.



<Fig. 5.3-42>

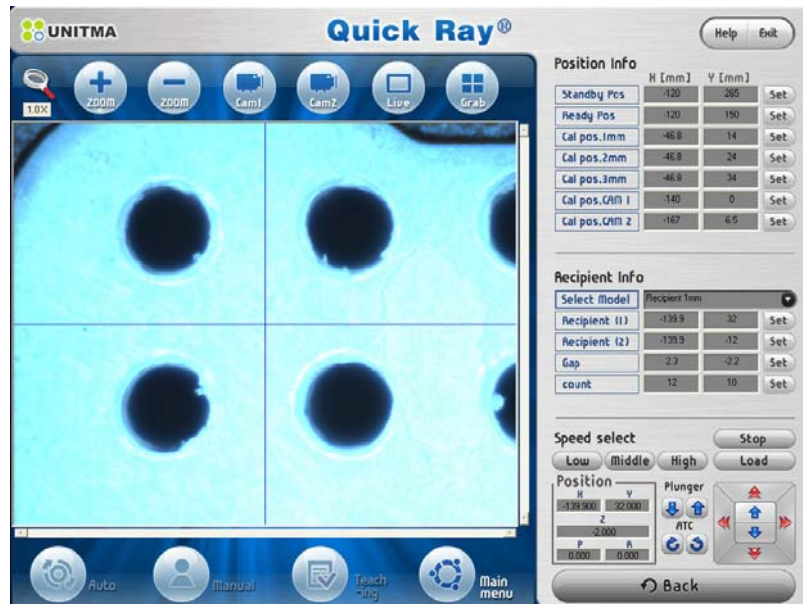
-> Screen <Fig. 5.3-42> shows captured image when the button is clicked.

Calibration 1mm Mark is made to move to the central part of the CAM 2 screen.

Tip: It is desirable for the Mark to be positioned at the center of the screen, but a little skewed position to the northeast direction makes the calibration easy.

Recipient (1)

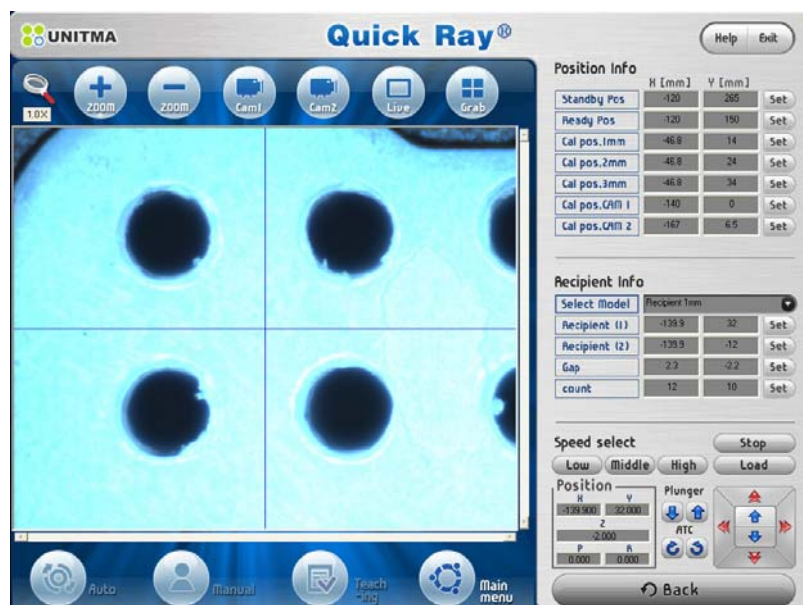
The starting location of the Recipient block hole can be designated. At this time, it would be prudent to select the location of 1mm, and this is attributable to the standard for the center of cross line to be the Recipient block marking.



<Fig. 5.3-43>

Recipient (2)

As in the Recipient (1), it may designate the starting location of the Recipient block hole. At this time, it would be prudent to select the location of 1mm, and this is attributable to the standard for the center of cross line to be the Recipient block marking.



<Fig. 5.3-44>

Gap

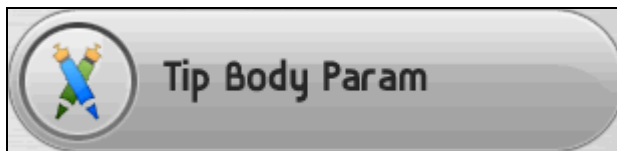
This is the hole gap. The location inputted by “Recipient (1)” and “Recipient (2)” becomes (A, 1) and other holes use this gap value to make automatic calculation.

count

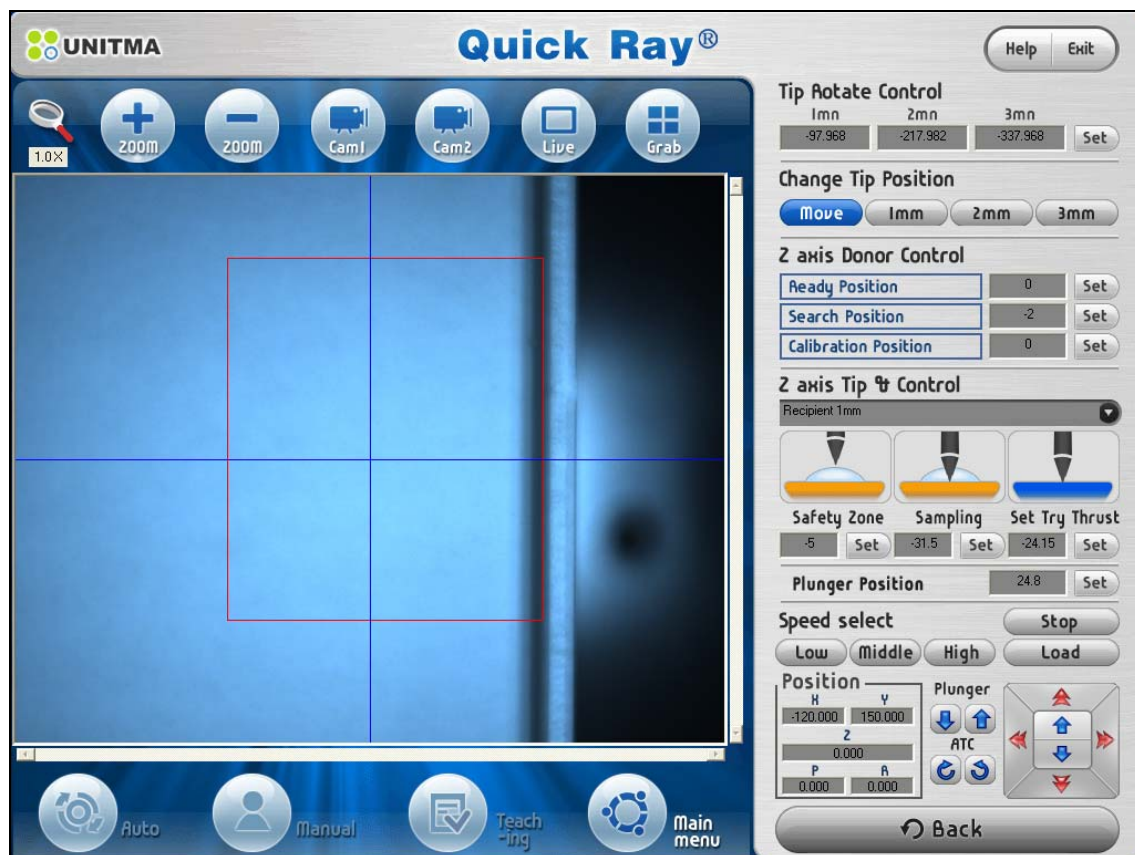
Input the vertical and horizontal number of the holes for the Recipient block.

	1mm is for 12 x 10 and 2mm for 10 x 6, and 3mm for 6 x 5. This value shall not be changed.
--	--

5.3.2.3.3. Tip Body Parameter



The “**Tip Body Param**” button is clicked to show the following screen<Fig. 5.3-45>. The users can be define the height and location of the applicable tip from each process.

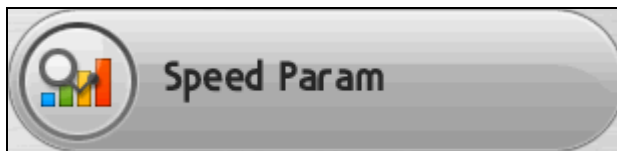


<Fig. 5.3-45>

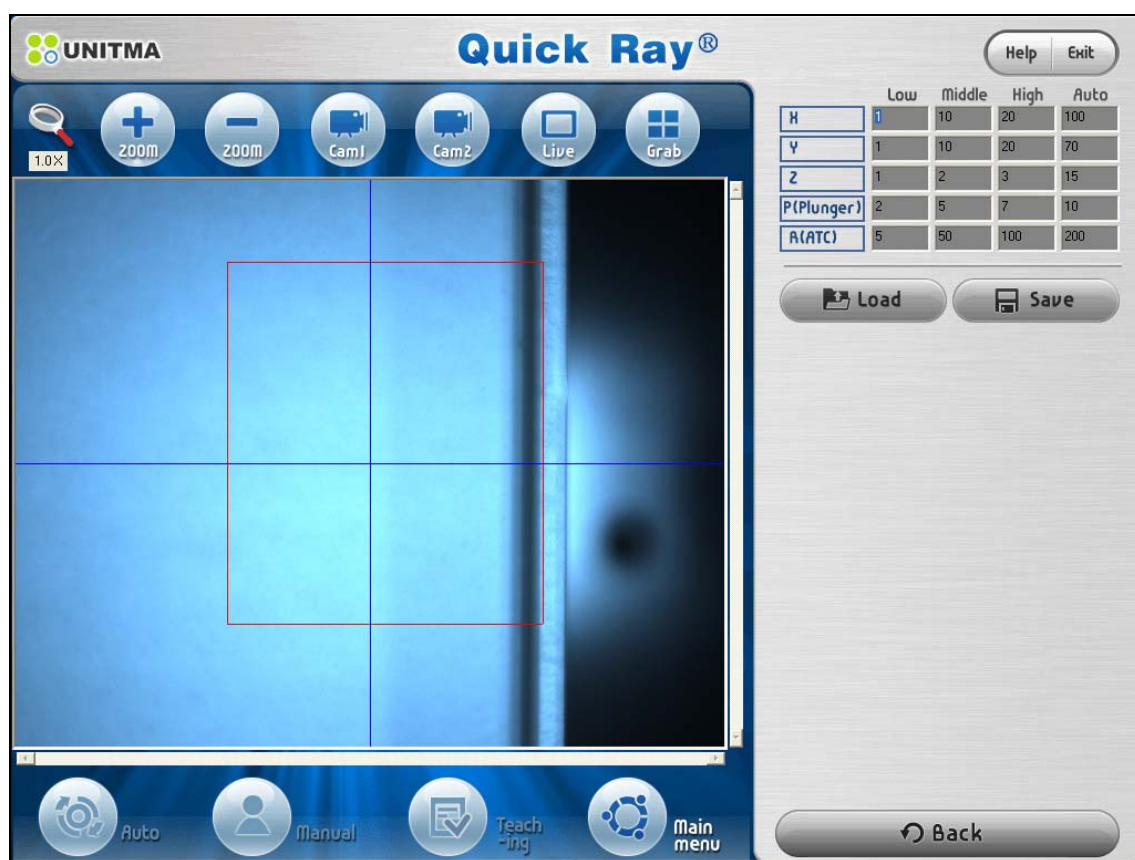
Button	Function
Tip Rotate Ctrl	The location of each tip can be defined. Each of the tips is separated for approximately 120 degree and this tip is rotating to use the desired size of the tip. If the rotation location is to be changed, the text box is to be input with numbers by using the touch pad and make sure to press the “ Set ” button to save and apply the value.

Change Tip Pos	<div data-bbox="496 280 651 338" data-label="Image"></div> <p>When the button is clicked, it moves to the ready location defined under 5.3.2.3.2 “Recipient Block Param”. This is the additional function to replace the tip in safe ways.</p> <div data-bbox="483 421 956 488" data-label="Image"></div> <p>When one of the buttons is clicked, the tip of selected size is to be located in the front. For example, if the 1mm button is clicked, the 1mm tip is located in the front part of the user.,</p>
Z axis Donor Ctrl	<p>Ready position is the place when the tip is replaced, and Search position is the value for Z axis when moved to the camera W.D(Working Distance). In addition, Calibration position is the Z-axis value when the calibration motion is being undertaken. The location can be modified by using the Touch pad and make sure to press the “Set” button to save to the modified location.</p>
Z axis Tip & Recipient Ctrl	<p>When making the motion related to the tissue insertion, the Z-axis height can be set. The location can be modified by using the Touch pad and make sure to press the “Set” button to save the modified location.</p> <p>“Safety Zone” is designated not to make the X and Y rotation at the area below certain height to prevent the damage to the tip.</p> <p>“Sampling” displays the location of the upper part of the palette with the tissue raised when the tissue is collected from the Donor block.</p> <p>“Set Try thrust” has to be set as close as possible to the hole with the height to insert the tissue onto the Recipient block.</p> <div data-bbox="496 1379 1129 1447" data-label="Image"></div> <p>The combo box is used to adjust the height for each tip.</p>
Plunger Pos	<p>This is to set the location of the needle when inserting the tissue. When pressing the push button from the Manual mode, it displays the location of the P axis. The location can be modified by using the Touch pad, and make sure to press the “Set” button to save the modified location.</p>

5.3.2.3.4. Speed Parameter



If the “**Speed Param**” button is clicked, following screen <Fig. 5.3-46> will be displayed. The user can define the speed of each motor.

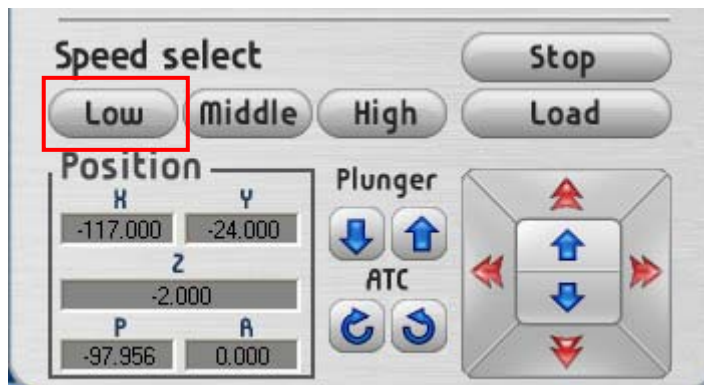


<Fig. 5.3-46>

Name	Function
Load & Save	The “ Load ” button brings the data saved to apply. The “ Save ” button saves the value already set.

Low

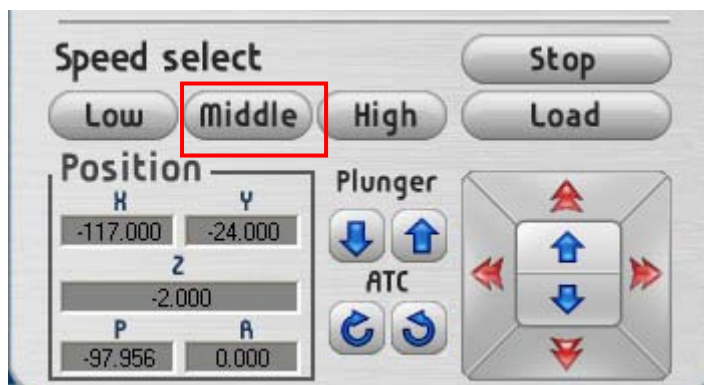
It defines the speed when the “**Low**” button <Fig. 5.3-47> is pressed at the “**Speed Select**” of the motion controller. It does not give any influence on the tack time. When the speed is to be modified, the touch pad is used to input the number on the text box, and make sure to press the “**Save**” button to save and apply the value.



<Fig. 5.3-47>

Middle

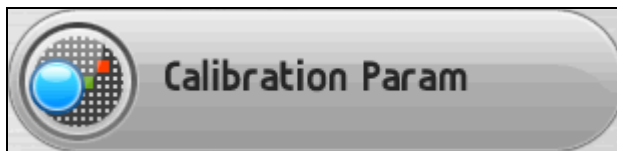
It defines the speed when the “**Middle**” button <Fig. 5.3-48> is pressed at the speed select of the motion controller. It does not give any influence on the tack time. When the speed is to be modified, the touch pad is used to input the number on the text box, and make sure to press the “**Save**” button to save and apply the value.



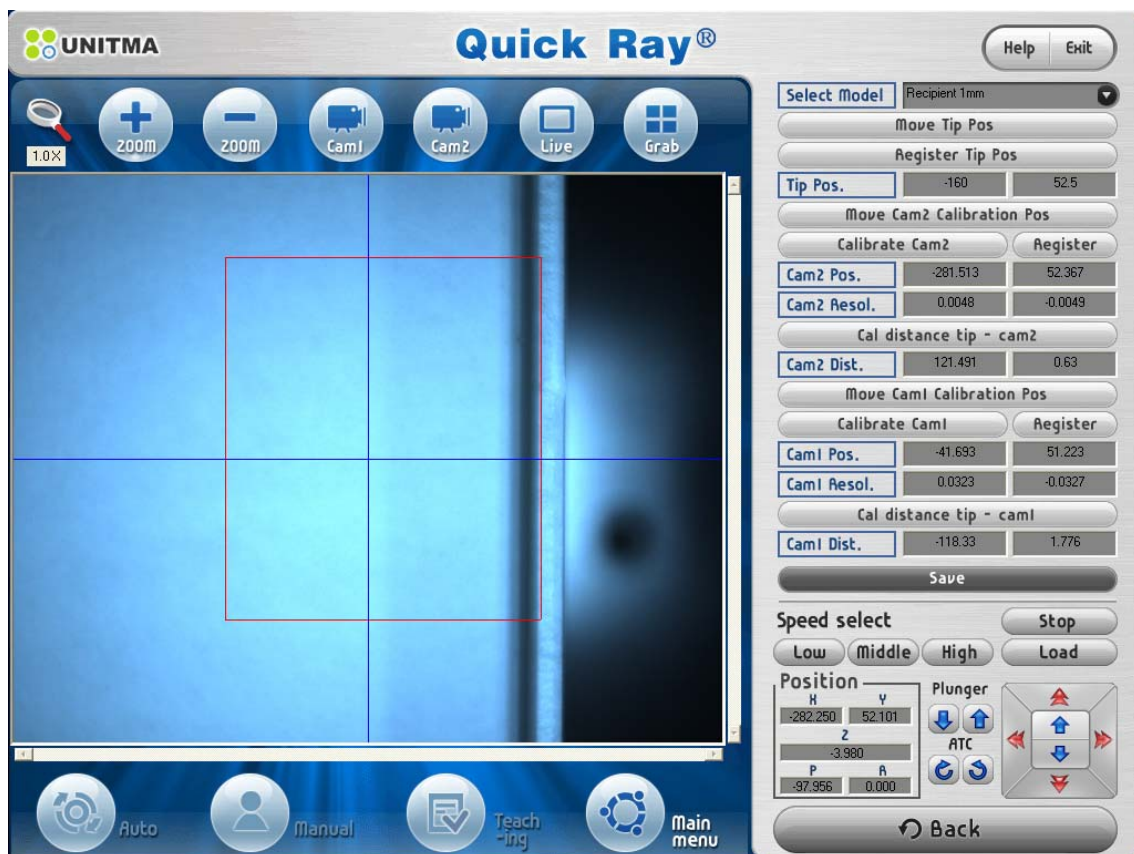
<Fig. 5.3-48>

<div data-bbox="242 264 312 309" data-label="Section-Header"> High </div>	<p>It defines the speed when the “High” button <Fig. 5.3-49> is pressed at the speed select of the motion controller. It does not give any influence on the tack time. When the speed is to be modified, the touch pad is used to input the number on the text box, and make sure to press the “Save” button to save and apply the value.</p> <div data-bbox="564 551 1275 931" data-label="Image"> </div> <p style="text-align: right;"><Fig. 5.3-49></p>
<div data-bbox="242 981 312 1025" data-label="Section-Header"> Auto </div>	<p>All speed operated in the Auto mode can be defined. It does influence the tack time. When the speed is to be modified, the touch pad is used to input the number on the text box, and make sure to press the “Save” button to save and apply the value.</p>

5.3.2.3.5 Calibration Parameter



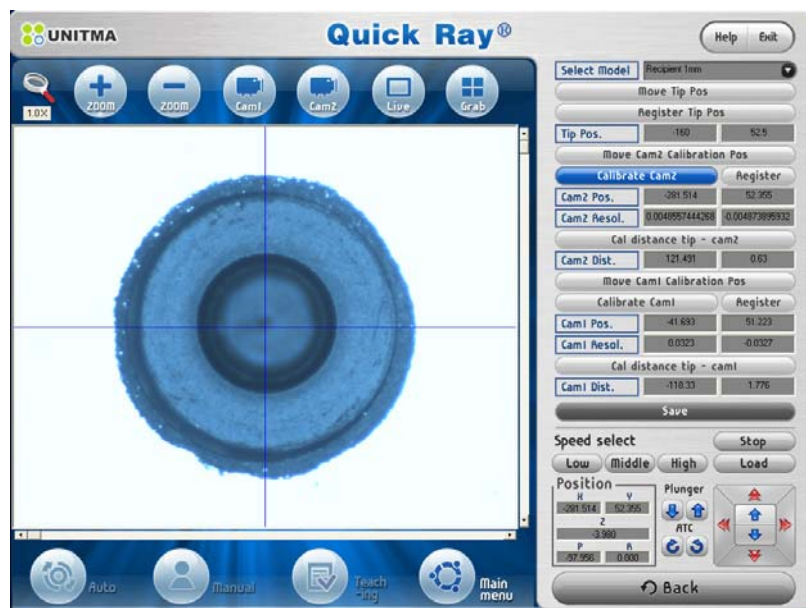
When the “**Calibration Param**” button is clicked, the following screen <Fig. 5.3-50> is shown. This is to calculate the value of distance from each camera to the tip as well as the pixel resolution of each camera. Each of the buttons is arranged as in the calibration sequence and, after completing the works, make sure to press the “**Save**” button to save the values already set.



<Fig. 5.3-50>

Name	Function
Select Model	The tip size can be selected from 1, 2, and 3mm. Once the tip size is selected, the location is automatically arranged to the applicable tip.
Move Tip Pos	It moves to the “ Cal. Tip pos ” as previously set in the 5.3.2.3.2.

	<p>“Recipient Block Param” Next, the user uses the motion controller on the lower part to move to locate the tip in the middle of the calibration mark.</p>
Register tip pos	<p>The location to move from the “Move tip pos” is memorized.</p>
Move CAM 2 Calibration Pos	<p>Following the “Select Model”, it moves to the calibration position. as already set at 5.3.2.3.2 “Recipient Block Param”. The location is prudently set to be located slightly to the northeast part from the center as described in the earlier paragraph. This is designed to prevent the phenomenon of the mark deviating from the camera FOV (Field of View).</p> <div data-bbox="512 656 1321 1256" data-label="Image"> </div> <p style="text-align: right;"><Fig. 5.3-51></p>
Calibrate CAM 2	<p>This is to calculate the pixel resolution of the camera. At first, the movement is made toward X-axis + direction by 0.5mm, then it moves to X-axis, – direction, Y-axis + direction, and Y-axis – direction, and the applicable pixel distance is calculated for the central point of each mark to formulate the resolution by the proportion. And the location is arranged to have the mark center to come into the central part to calculate the distance between the tip and camera 2.</p>



<Fig. 5.3-52>

Cal distance tip –
CAM 2

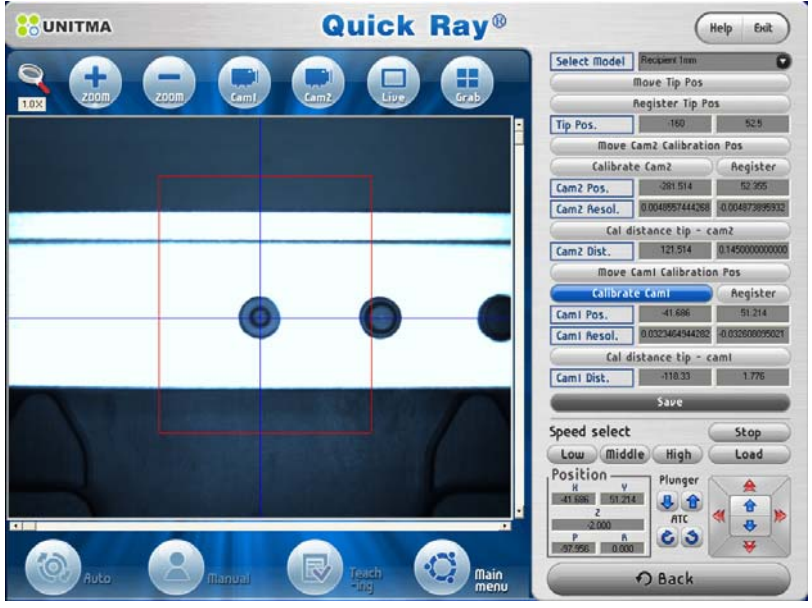
If this button is pressed, it calculates the distance from the tip location calculated earlier and the focused location of the camera 2.

Move CAM 1
Calibration Pos

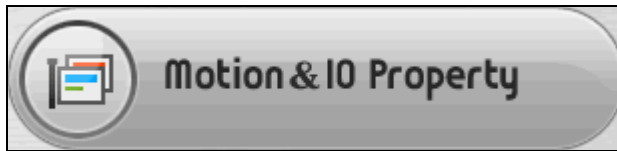
By following the value set from the “**Select Model**”, Camera 1 moves to calibration position mark as set in the 5.3.2.3.2. “**Recipient Block Param**” in advance.



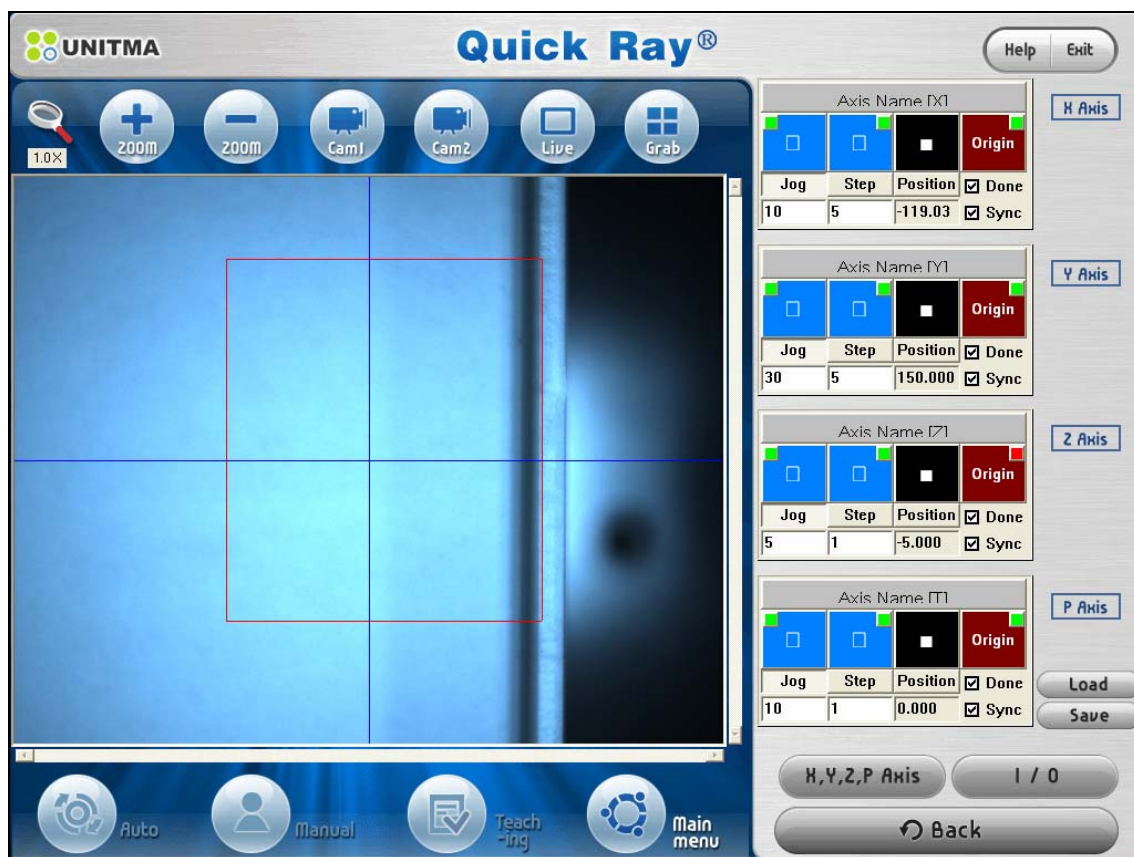
<Fig. 5.3-53>

Calibrate CAM 1	<p>The pixel resolution of the camera is calculated. At first, the movement is made toward X-axis + direction by 0.5mm, then it moves to X-axis, – direction, Y-axis + direction, and Y-axis – direction, and the applicable pixel distance is calculated for the central point of each mark to formulate the resolution by the proportion. And the location is arranged to have the mark center to come into the central part. And, the distance between the tip and camera 1 will be calculated automatically.</p>  <p style="text-align: right;"><Fig. 5.3-54></p>
Cal distance tip – CAM 1	If this button is pressed, it calculates the distance from the location of the tip calculated earlier and the central location of the camera 1.
SAVE	This is the most important button. After completing every process as in the above sequence, make sure to save new values to be applied to the program. When the “ Back ” button is used, new values are saved automatically, but when the screen conversion is made by clicking the “main menu” in the sub-menu, they are not saved at all.

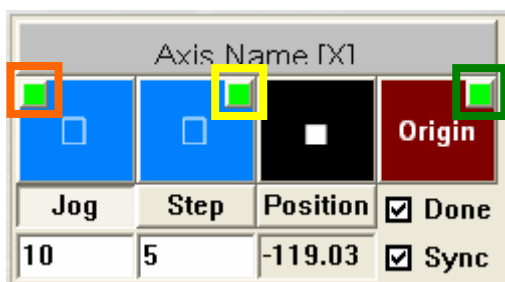
5.3.2.3.6 Motion & IO Property



The “**Motion & IO Property**” button is clicked to have the following screen as <Fig. 5.3-55>. This is to modify the set value of each motor axis and some sensor condition may be monitored through I/O.

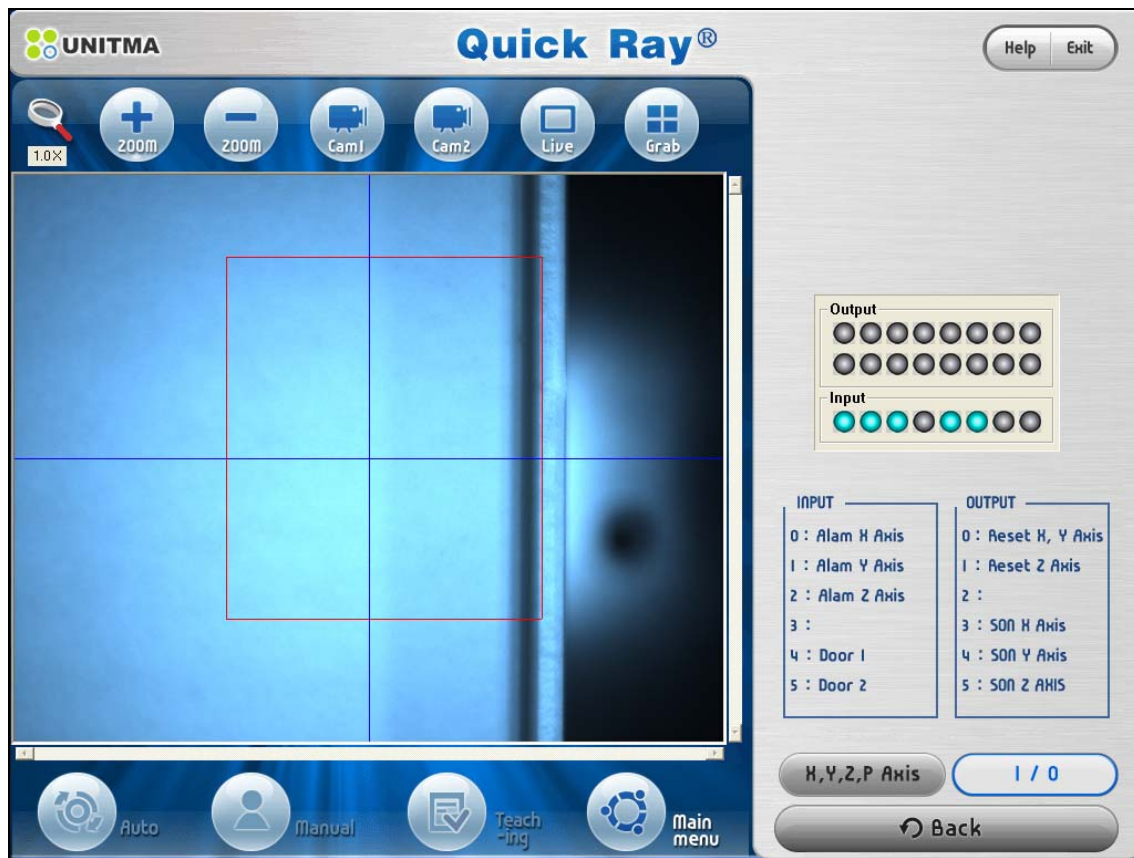


<Fig. 5.3-55>



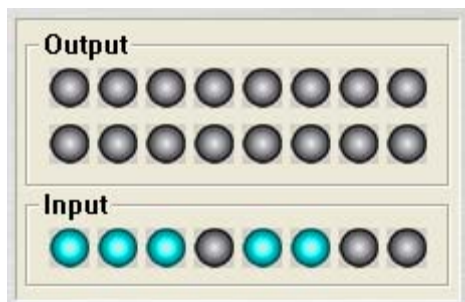
<Fig. 5.3-56>

The orange colored rectangle is the – limit sensor, and the yellow on is the + Limit sensor, and the green is the origin sensor. When this square turns to red, it means that the sensor has the signal. As the control with the screen controls directly the motor, the button has to be pressed with the location of the tip in mind.



<Fig. 5.3-57>

While there is no problem with the program, five input signals are on as above.



<Fig. 5.3-58>

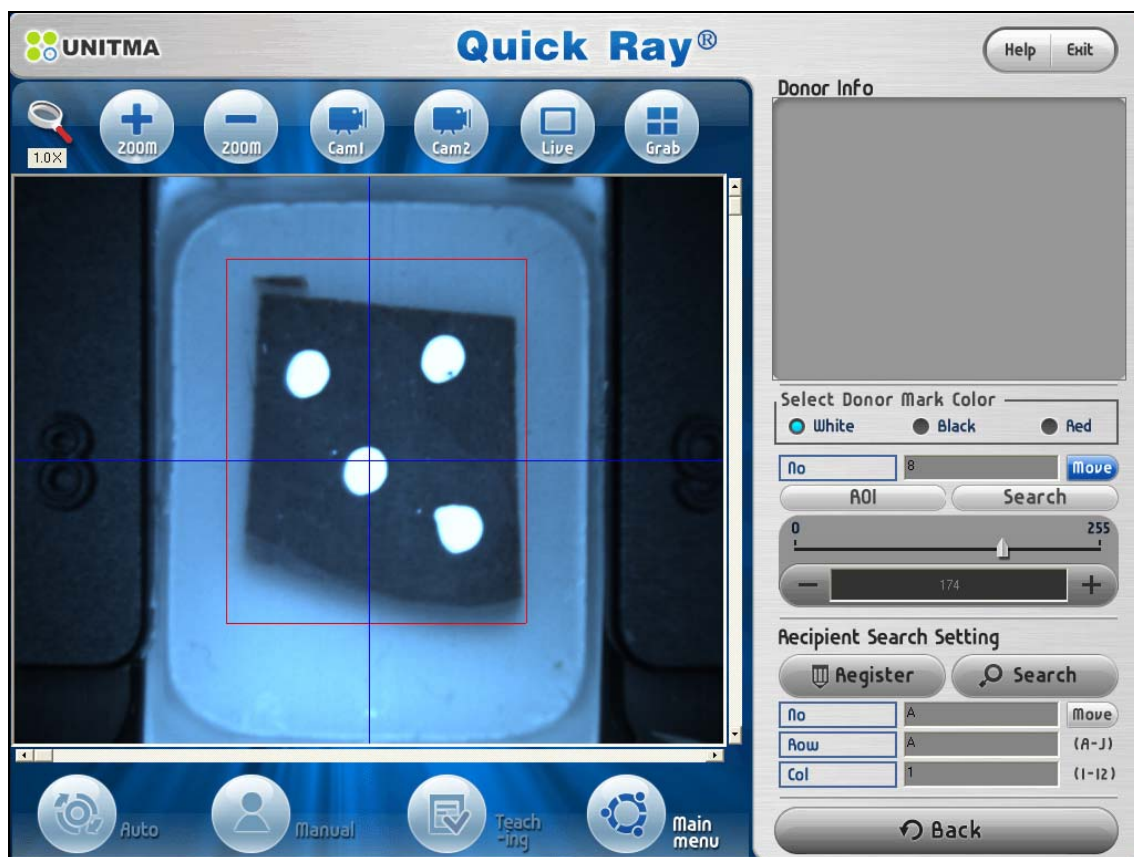
for the access.

If there is no signal for 0, 1, and 2, it means that the motor control has problem, and if there is no signal for 4 and 5, it means the front door is open. When the signal of 1 or 2 is died out, it means the applicable (0 for X, Y axis and 1 for Z axis) output signal is to be provided to reset the motor alarm. When reset is made, output is to be released again. Output 3, 4, and 5 is to off motor servo, therefore the user is not permitted


5.3.2.3.7 Marker Parameter

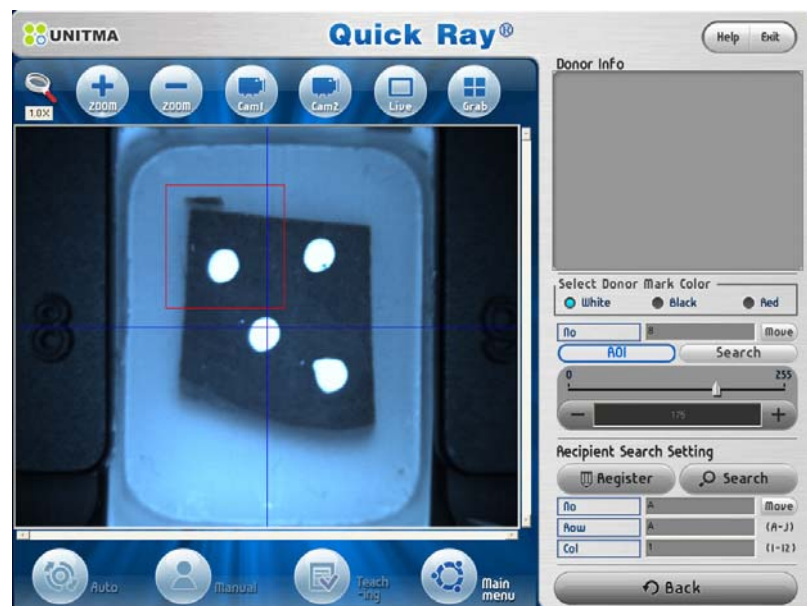


This is to show the screen when the “**Marker Param**” button is pressed as<Fig. 5.3-59>. It finds the mark set for the location of the donor to be collected and the focal point of the Recipient block hole.



<Fig. 5.3-59>

Button	Description of function
Select Donor Mark Color	Inspector may select the color of the mark displayed with the location of the tissue to be collected from the Donor block.
ROI	 It displays the territory to find the donor marked by the red line shown on the screen. This “ ROI ” territory may be set again. For example, if the following territory is set, it reads the mark located on the left upper side from the four marks on the screen. When the “ ROI ” button is pressed, the red square is turned into the dotted line to change the value, and it is saved if the “ ROI ” button is pressed again.

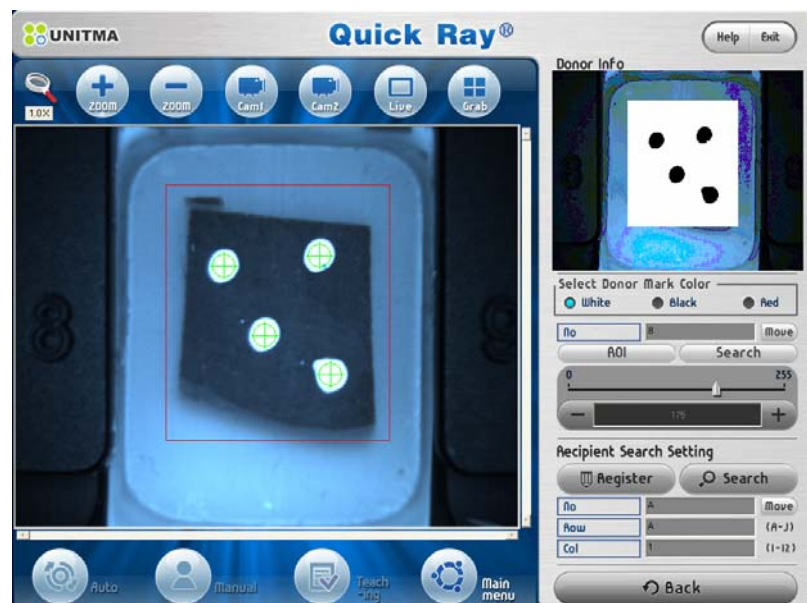


<Fig. 5.3-60>

Search



Select White at the “**Select Donor Mark Color**” and press the “**Search**” button to find the location of the white point of the mark shown on the tissue as shown in the following figure <Fig. 5.3-61>. The already set threshold value can be modified as the user wishes by using the slider bar under the “**Search**” button or the + and – buttons. At this time, the reduced image is generated on the gray box under the “**Donor Info**” and it helps to generate more accurate threshold value with the image. It is recommended that the suitable threshold value has to be set before starting the process. Otherwise, it may cause improper reading of the mark.



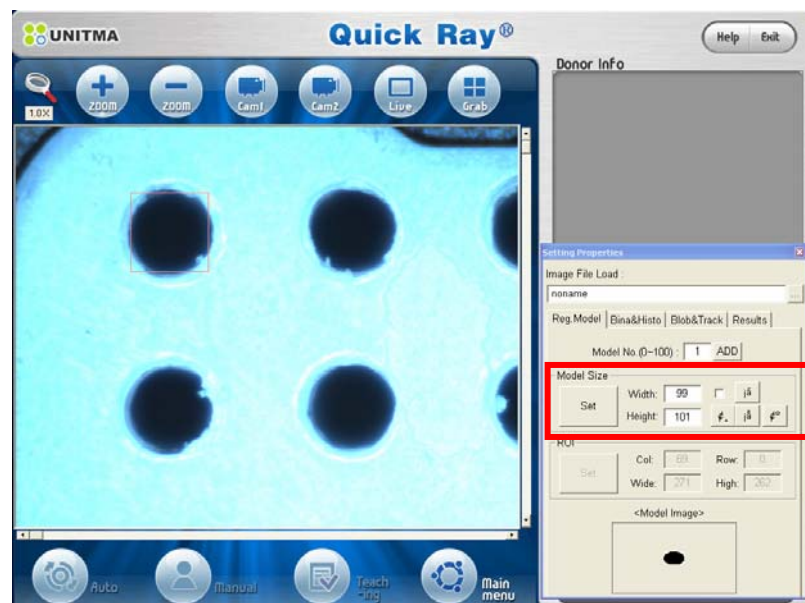
<Fig. 5.3-61>

Register



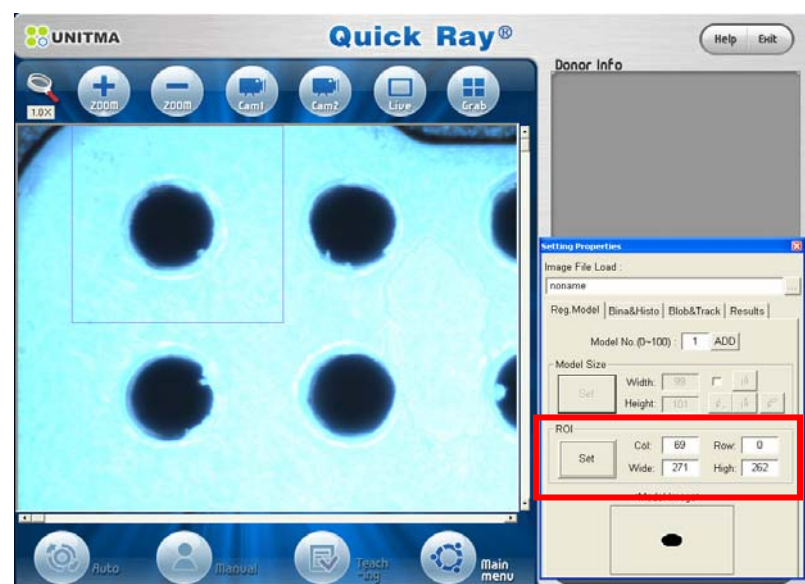
This is to define the size of the Recipient block hole and it shows the following screen as <Fig. 5.3-62>. The “Set” button of the Mark Size is used to define the size of the mark, and the territory of the mark to find through “ROI” can be set, too. In the event of 1mm, the Recipient block hole has so many cases of large and small dents that it would be better to register a little smaller than the original size. In addition, as the “Marker Param” does not include the function of selecting the “Core Size”, the user need to modify the “Core Size” by loading Excel file from the Auto Mode and define hole sizes for each applicable size.

<Mark size>

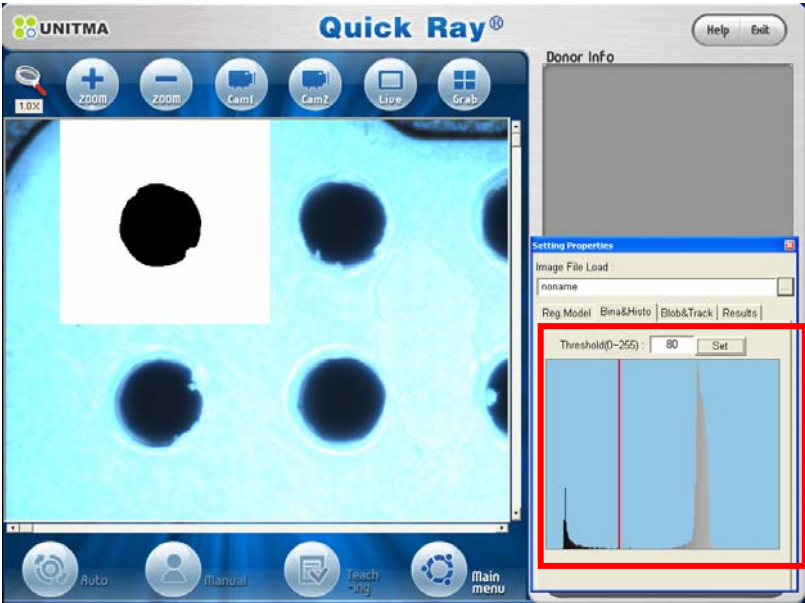

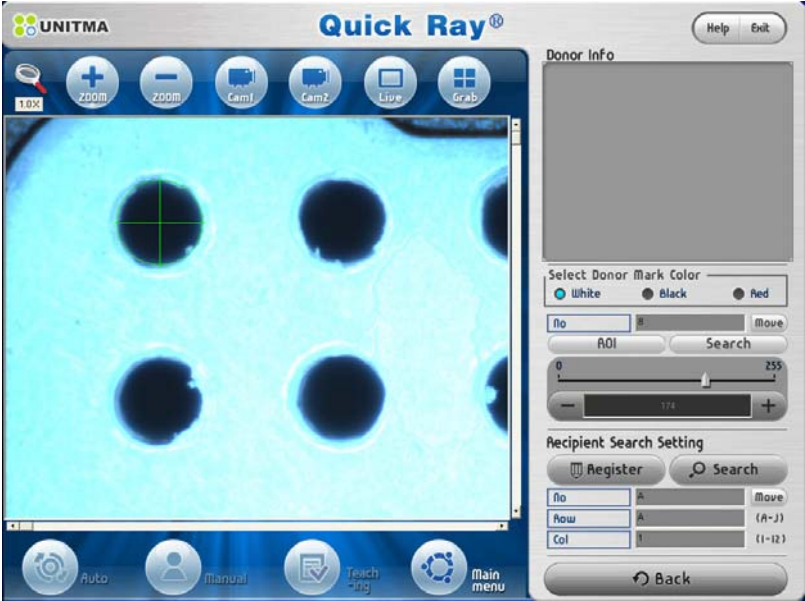



<Fig. 5.3-62>

<ROI>



<Fig. 5.3-63>

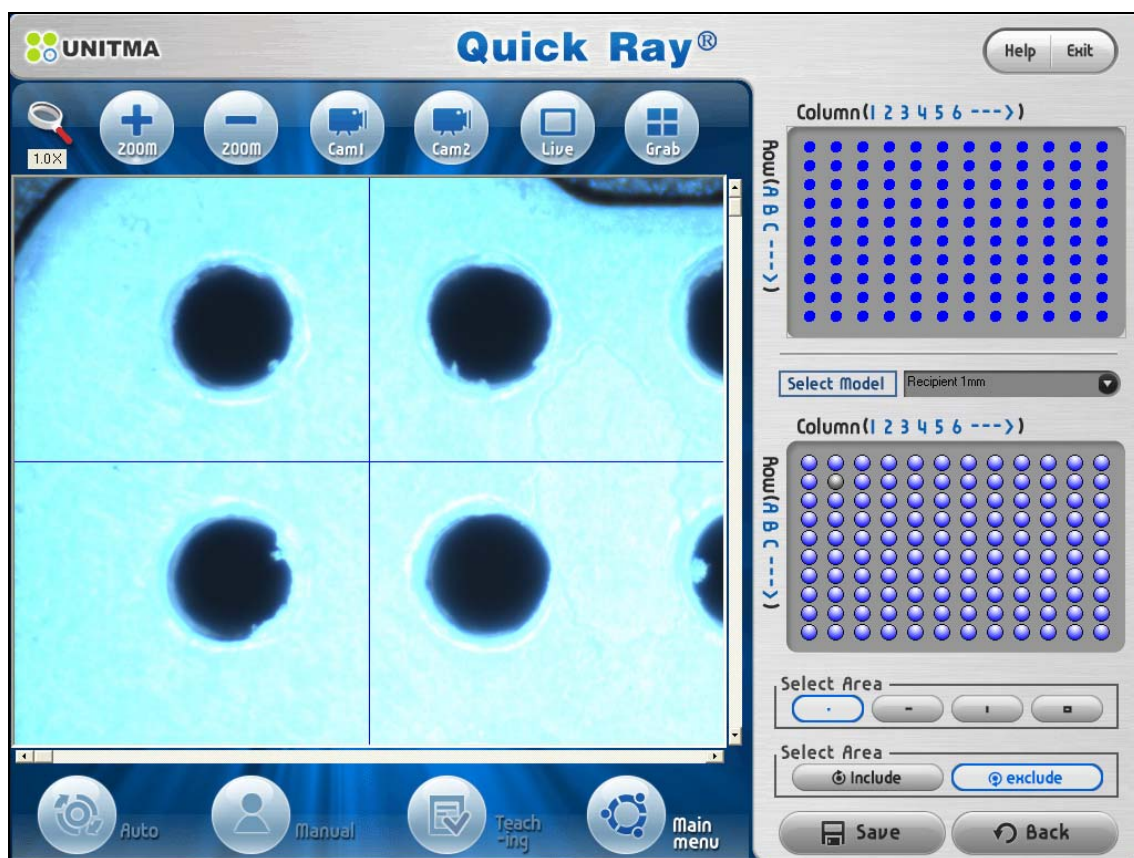
	<div data-bbox="523 275 1331 875"></div> <div data-bbox="1141 896 1300 927" data-label="Caption"><p><Fig. 5.3-64></p></div> <div data-bbox="434 943 1422 1173"><p>On the “Bina & Histo” tap, the present image histogram is shown<Fig. 5.3-64>, and through this, the threshold value can be set for easy finding of the Recipient block hole. On the “Blob & Track” tap, the “Execute” button is used to find the mark in advance. In the result, the I information of mark found is included. The basic value is set in advance, but if the recognition rate of the hole is declined, take a look at it again.</p></div>
Search	<div data-bbox="448 1182 751 1261"></div> <div data-bbox="775 1182 1422 1294"><p>When the “Search” button is pressed, the location of the Recipient block hole can be found as in the following figure <Fig. 5.3-65>.</p></div> <div data-bbox="523 1308 1331 1906"></div> <div data-bbox="1141 1926 1300 1957" data-label="Caption"><p><Fig. 5.3-65></p></div>

Move		As in the Manual mode, the “ Move ” button is used to move camera to the location of the desired Donor block and the location of the Recipient block hole.
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5.3.2.3.8 Recipient Hole Parameter




This is the screen shown as <Fig. 5.3-66> when the “**Recipient Hole Param**” button is pressed. This is to find the mark defined for the location of the donor to be collected and the central point of the Recipient block hole.

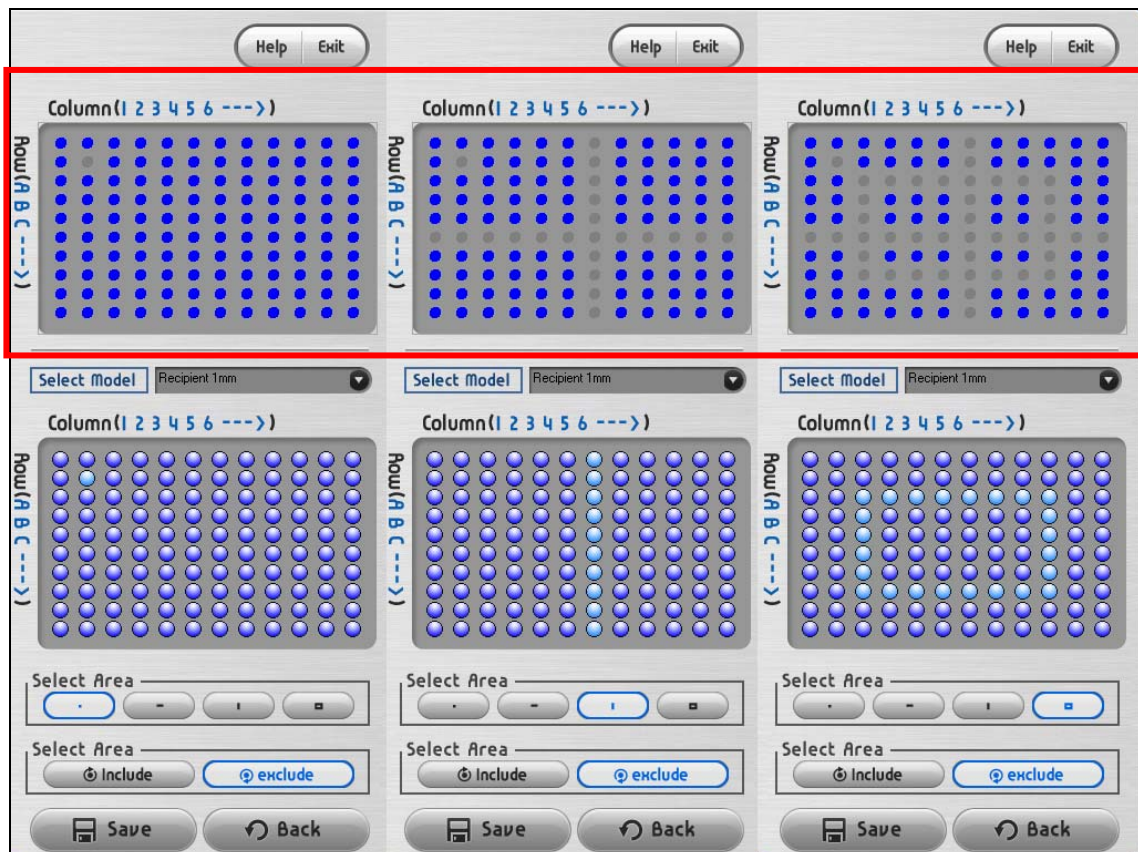


<Fig. 5.3-66>

Button	Description of function
Select Model	The combo box is used to select the core size.
Select Area	<div data-bbox="448 1733 1082 1989"> </div> <p>From the Recipient block holes, hole to use and hole not to use may be selected according to user's wishes.</p>

Save	 Save	It saves the information of Recipient block hole for its being included or excluded.
------	--	--

Select the area method to use first, as in the following screen <Fig. 5.3-67>. After selection of inclusion, press “**Save**” button and the window of the Recipient block condition changes. (The situation of the horizontal situation is omitted from the screen).



<Fig. 5.3-67>

5.3.2.4 EXIT

For the method to “EXIT” the program, there are two ways.



<Fig. 5.3-68>

As above if the “EXIT” button is pressed from the main menu or presses the “Exit” button on the title bar as in the following figure, the program is existed.



At this time, be noted that do not press the “Exit” button when the program motion is not completed in the Auto mode. And, when the program is in the “Pause” condition, the program cannot be existed. Make sure to complete the motion or press the suspend button to exit the program.

5.3.2.5 HELP

When the “Help” button is pressed on the title bar at the upper part of the program, this file, as the manual of UATM, can be accessed.



6. CLEANING & MAINTENANCE

6.1. Cleaning the instrument



- For safety unplug the AC power cord from the electrical outlet before cleaning.
- Do not allow liquid or small particles to get into the instrument or accessories when cleaning.

- **Cleaning the connectors**

Do not use when the connecting cables of the instrument and AC power cord are not clean. Remove the dirt with a dry cloth or cotton swab. When being used under unclean condition the flow of electrical current may be obstructed.

- **Cleaning the LCD screen**

Wipe gently with a soft cloth. Be careful to avoid scratching on the LCD screen.

- **Cleaning the exterior surface**

Wipe gently with a damp cloth and then dry the surface. Do not use solvents or other chemicals to clean the exterior of the instrument.

Clean the ventilation grids on the side of housing panels with a brush or vacuum cleaner to remove dust and dirt.

- **Cleaning the interior surface**

Open the cover door and wipe gently with a damp cloth and then dry the surface. Do not use solvents or other chemicals to clean the interior of the instrument.

- **Cleaning the puncher and tip**



- Keep the front door of the instrument at a safe distance from your head and face.
- Be careful with your fingers and hands not to be injured by the needle of tip or the block holder tray during assembling or disassembling; or when cleaning the

- 1) Unplug the AC power cord from the electrical outlet.
- 2) Open the front door
- 3) Disassemble the puncher from the puncher module of the instrument.

4) Wipe the puncher body and the tip gently with a damp cloth, and then dry the surface. Do not use solvents or other chemicals to clean the exterior of the instrument.

- **Cleaning the block holder tray**

- 1) Unplug the AC power cord from the electrical outlet.
- 2) Open the tray door
- 3) Disassemble the block holder frame from the instrument.
- 4) Disassemble the Donor block and the Recipient block holder from the block holder tray.
- 5) Wipe the Recipient block holder top and the Recipient block holder bottom and the block holder frame gently with a damp cloth, and then dry the surface. Do not use solvents or other chemicals to clean the exterior of the instrument.

6.2. Replacing consumable

- **Consumables list**

Three different size Recipient blocks:

10 x 12 wells of 1mm in diameter

6 x 10 wells of 2mm in diameter

5 x 6 wells of 3mm in diameter

- **Replacing the Recipient block**



- **Keep the tray door of the instrument in a safe distance from your head and face.**
- **Be careful for your fingers or hand not to be injured by the needle of tip when assembling or disassembling the recipient blocks from the recipient block holder tray.**
- **Be careful not to compress your fingers when closing the tray door of the instrument.**

- 1) Wait until the operation of the instrument is finished and stopped.
- 2) Open the tray door.
- 3) Disassemble the Recipient block holder tray from the jig for the Main plate of the instrument.
- 4) Disassemble the Recipient block holder from the Recipient block holder tray.
- 5) Disassemble the Recipient block from the Recipient block holder.
- 6) Insert the new Recipient block into the Recipient block holder.
- 7) Put the Recipient block holder with the new Recipient block into the block holder tray.

- 8) Assemble the Recipient block holder tray into the Main plate of the instrument.
- 9) Close the tray door.

6.3. Replacing components

- **Replaceable components list**

- 1) Puncher
- 2) Tip
- 3) Block holder tray
- 4) Recipient block holder



- **Keep the cover door of the instrument at a safe distance from your head and face.**
- **Be careful with your fingers or hand not to be injured by objects to be replaced.**
- **Be careful not to compress your fingers when closing the cover door of the instrument.**

- **Replacing the puncher**

- 1) Unplug the AC power cord from the electrical outlet
- 2) Open the front door.
- 3) Disassemble the puncher from the puncher module of the instrument.
- 4) Assemble the new puncher into the puncher module of the instrument.
- 5) Close the front door.



- **Make sure the diameter of tip's needle of the new puncher is the same as with the diameter of tip's needle of the disassembled puncher. Check that the position of the new puncher in the puncher module is the same as with the position of the disassembled puncher module.**

- **Replacing the tip**

- 1) Unplug the AC power cord from the electrical outlet
- 2) Open the front door.
- 3) Disassemble the puncher from the puncher module of the instrument.
- 4) Loosen the screw of the tip, and disassemble the tip from the puncher body
- 5) Replace with new tip and tighten the screw then assemble the new tip into the puncher body
- 6) Assemble the new puncher into the puncher module of the instrument.
- 7) Close the front door.



- Make sure the diameter of tip's needle of the new tip is the same as with the diameter of tip's needle of the disassembled puncher body. Check that the position of the new tip in the puncher body is the same as with the position of the disassembled puncher body.

● Replacing block holder tray

- 1) Wait until the operation of the instrument is finished and stopped.
- 2) Click on "Set Tray" button
- 3) Open the front door.
- 4) Disassemble the Recipient block holder tray from the jig for the Main plate of the instrument.
- 5) Assemble the new Recipient block holder tray into the jig for the Main plate of the instrument.
- 6) Close the front door.

● Replacing Recipient block holder

- 1) Wait until the operation of the instrument is finished and stopped.
- 2) Click on "Set Tray" button
- 3) Open the front door.
- 4) Disassemble the Recipient block holder tray from the jig for the Main plate of the instrument.
- 5) Disassemble the Recipient block holder from the Recipient block holder tray.
- 6) Put the Recipient block holder with a new Recipient block into the Recipient block holder tray.
- 7) Assemble the Recipient block holder tray into the jig for the Main plate of the instrument.
- 8) Close the front door.

6.4. Maintenance

6.4.1. Checking the instrument

UNITMA recommends that the instrument be checked by the user at least once every six months or whenever you move the location of the instrument.

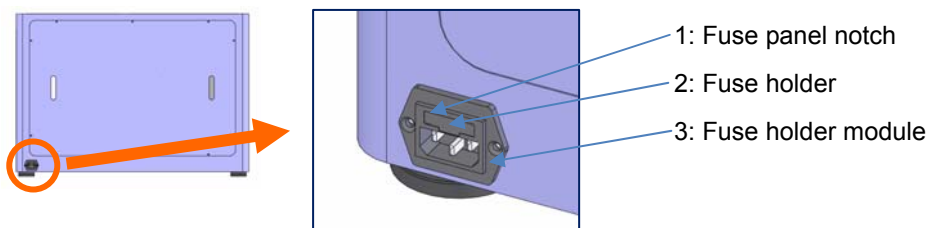
Check	Action
Exterior & Interior	• Clean as the instruction (5.1. Cleaning the instrument)
Labels	• Check for readability or missing labels
AC cord	• Check the cord and molded connectors for damage
Feet	• Check for presence of all four legs • Check legs for physical damages or deteriorations
Power cord receptacle	• Make sure receptacle is free of foreign matter • Check for presence of all three connector pins and make sure they are straight
Run 'Demo' mode	• Turn on the instrument and run 'Demo mode' • See 'Error message'

6.4.2. Replacing the fuse



- Only use a fuse of the same specification. For the required value, please refer to the fuse specification in this manual
- Unplug the AC power cord. Removing or touching the fuse with the AC power cord plugged will expose you to hazardous voltages and cause death.

1) Locate the fuse holder module. It is located as part of the power cord assembly on the back of the instrument.



2) There is a notch at the bottom of the fuse panel where you can insert a flat-head screw driver or some other flat object. Use leverage to open the fuse panel as it opens upward from the bottom.

3) Pull out the fuse holder. The fuse holder has a fuse.

4) Remove the old fuse by gently pulling it out.

5) Insert the new fuse into the fuse holder.

6) Slide the fuse holder back into the fuse holder module.

7) Snap the cover of the fuse panel.

6.5. Repair



- Please contact UNITMA for repairing services, replacement of components and additional consumables.

6.6. Disposal of waste

- Disposal of waste from Donor block or Recipient block with tissue specimen

- 1) The waste with tissue specimen should be contained and handled separately from other wastes at the point of generation.
- 2) The waste with specimen shall be placed in a red biohazard bag.
- 3) Red biohazard bags are to be tied.
- 4) Red biohazard bags are to be placed for storage, handling, and transport in rigid containers with tight-fitting lids labeled with the words "Bio hazardous Waste," or the word "Biohazard," and the international biohazard symbol on the lids and sides so as to be visible from any lateral direction.

5) Pathology Waste: All pathological wastes must be separated from other medical hazardous wastes. Waste will be placed in a red bag and deposited into a specially marked secondary container labeled with words "Pathology Waste" or "PATH." The container will be stored in the morgue refrigerator until pick-up by authorized medical waste hauler for transportation to an approved incineration facility. Once specimens or tissues are deemed waste, they shall not be stored for more than seven (7) days at a temperature above 32 degrees Fahrenheit.

- **Disposal of Tip waste**

- 1) The tip waste must be contained in a special sharp object container.
- 2) The waste with specimen shall be placed in a red biohazard bag.

7. TROUBLE SHOOTING

7.1. Instrument failures

Some failures or malfunctions of the instrument are indicated by the applicative software as error message. Follow the software instructions to solve the problems and take corrective actions.

7.2. Operating error with possible causes and corrective action

no	Error message	Possible Cause and corrective action
1	It is Not selected hole	When running the Auto Mode neither the Donor block nor the Recipient block hole has been selected during the Set mode. Please refer to section 5.3.2.3 "SET" menu of this operating manual.
2	It is already registered with hole.	When during the "SET" mode the hole of the Recipient block has been selected two times, this message will show. Please select another hole on the Recipient block to receive the tissue specimen.
3	Nothing to extract from a Donor at this time.	When using the Set Mode, the maximum number of punching holes from Donor block is 40. This error message will disappear automatically and no more selection will be accepted.
4	Selected All Hole	When the available number of holes in the Recipient block has been filled and no more tissue specimens from Donor blocks can be accepted.
5	Do Initialize	To run the instrument, initialization from Auto mode must be selected. When this error message appears, please initialize at the Auto mode menu screen.
6	Not Execute Excel.	To write the report of the Recipient block you need Excel program installed and functional on the instrument's PC. Please check for software installation instructions

		on your Window O/S
7	Not measured the height block.	<p>When Run button has been pressed without measuring the heights of each block, this error message will be displayed.</p> <p>From Auto Mode screen touch Measure button for the instrument's height gauge measures the height of each block and can run the program.</p>
8	Check!! Recipient block & tool.	<p>To run the program you need to visually check whether both the size of the tool's tip and Recipient block matches. You need to confirm that it is the correct size to run the program.</p>
9	Front door is opened. Please close the door.	<p>In order to run the program, the cover door must be closed. Please check the door is closed and run the program.</p>

8. WARRANTY & SERVICE

UNITMA CO., LTD (UNITMA) has limited warranty for the Quick Ray Master against defects in material and workmanship under normal use and service for period of 1 year from the date of purchase.

8.1. Terms & Conditions

- 1) UNITMA will, at no charge, either repair the Quick Ray Master (with new parts) or replace it with a new unit during the warranty period provided it is returned in accordance with the term of the warranty. Replaced parts are warranted for the balance of the original applicable warranty period. All replaced parts of the products shall become property of UNITMA.
- 2) This limited warranty is extended by UNITMA to the original end-user purchaser and is not assignable or transferable to any other third party.
- 3) UNITMA can not be responsible in any way for any additional equipment not furnished by UNITMA which has been attached to or used in connection with the product.
- 4) Customer must provide proof of purchase (bearing the date of purchase and the product's serial number) in order to receive warranty service. Warranty service will be provided by UNITMA through one of its authorized warranty service centers.

8.2. The Warranty does not cover:

- 1) Defects or damage resulting from the use of the product other than its normal customary use.
- 2) Defect or damage from misuse such as breakage, spillage of liquid or substances that can cause circuit –shortcut of the electronic boards and battery leakage, etc.
- 3) Defect or damage from improper testing, operation, installation, alternation, modification or adjustment of the instrument.
- 4) Breakage or damage unless caused directly by the defects in material and workmanship.
- 5) A product with unauthorized product modifications, disassembles, and/or repairs which adversely affect the performance of the product.
- 6) A product with serial number and/or the warranty seal removed or made ineligible.
- 7) Scratches or other cosmetic damage to the product that do not affect the operation.
- 8) Normal and customary wear and tear.
- 9) Force Majeure ; any damage beyond the reasonable control of Unitma such as but not limited to: Fire, Flood, Earthquake, act of Terrorism, etc
- 10) Shipping costs for pick-up and delivery from your facility.

8.3. Contact for technical service

Please contact UNITMA CO., LTD for technical service.